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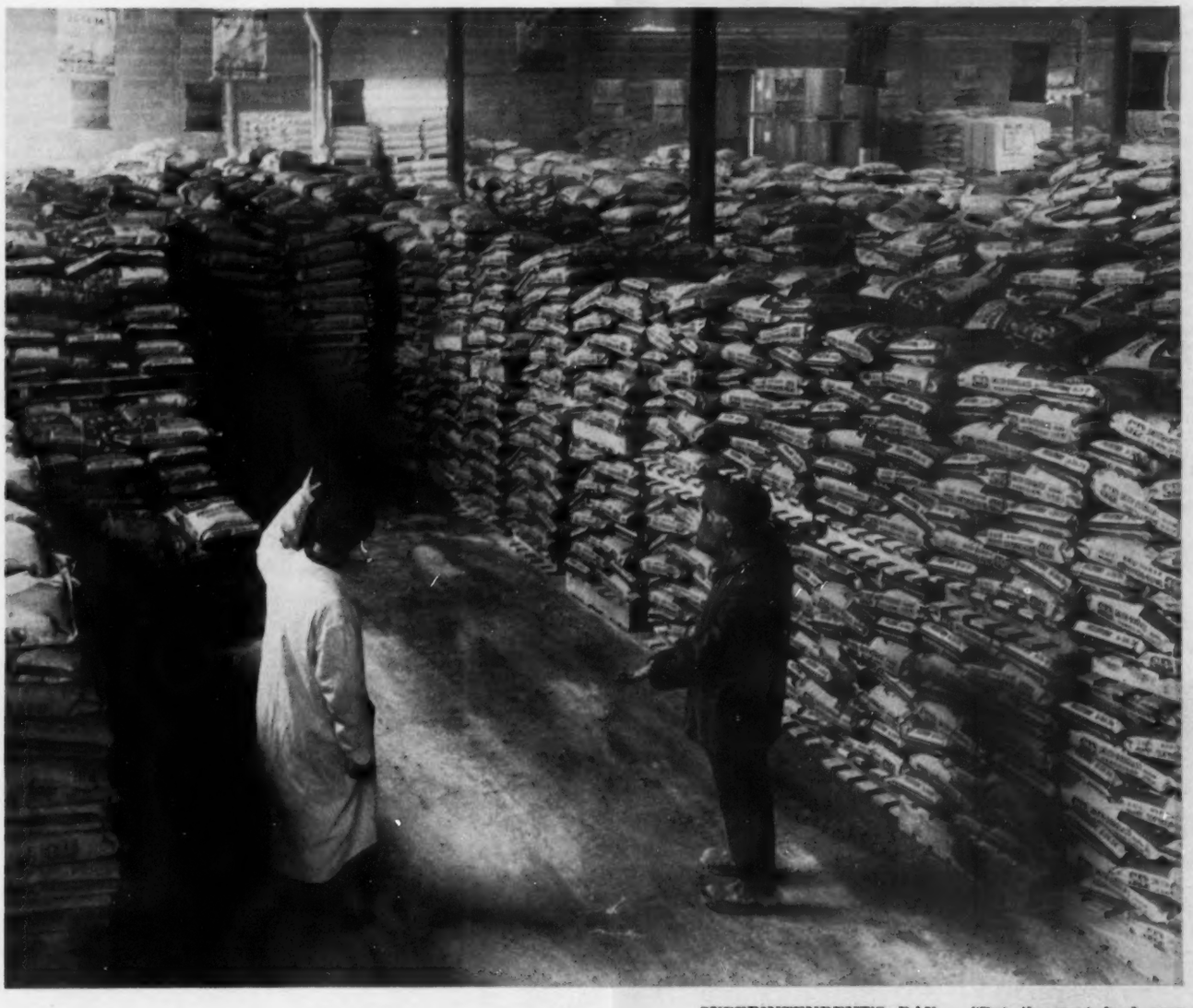
PRODUCTION EDITION

for Manufacturers of Chemicals for Agriculture



SUPERINTENDENT'S DAY — "Put the next load over there," says "Dutch" Suderman, superintendent of Smith-Douglass plant, Streator, Ill. "But what'll we do after that?" asks R. J. Kidd, fertilizer superintendent. Story, pages 6-7.

IN THIS ISSUE . . .

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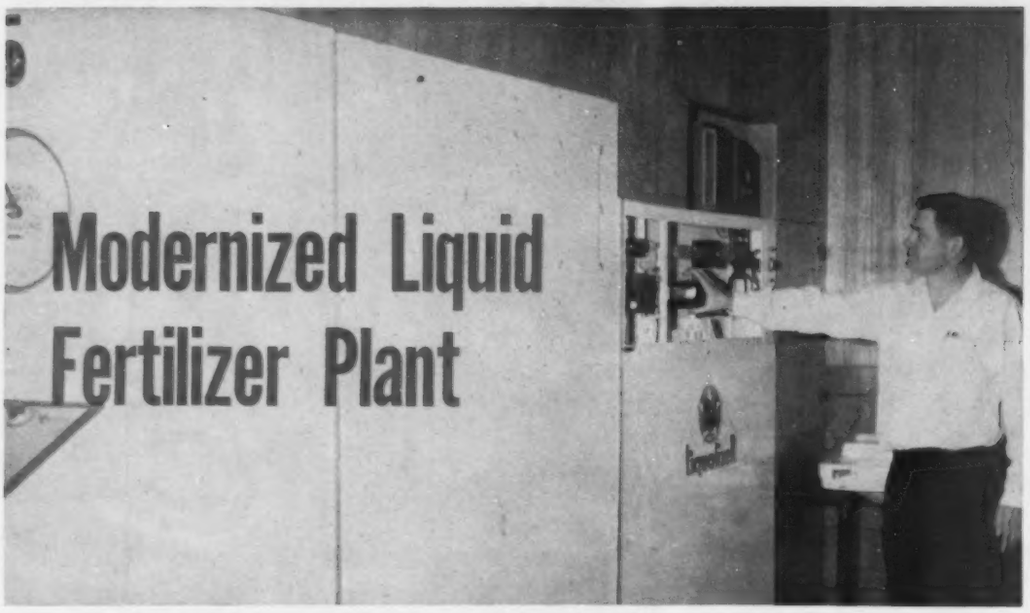
Modernized Liquid Fertilizer Plant



MODERNIZED liquid plant is pride and joy of Lyle Carpenter, owner of Carpenter Supply Co., Bondurant, Iowa. Recent expansion program has included installation of new liquid fertilizer manufacturing facilities to supplement earlier equipment. New setup is well worthwhile, Mr. Carpenter says.

INSTALLATION of modern automatic equipment for the manufacture of liquid fertilizers has made the plant of Carpenter Supply Co., Bondurant, Iowa, both a thing of beauty and a profitable enterprise, according to Lyle Carpenter, owner. The new equipment, plus adequate bulk storage facilities, make the plant an outstanding one.

Mr. Carpenter, now in his early 30's, built his first liquid blending plant in 1958 to round out his already existing fertilizer service which at that time included solutions as well as anhydrous ammonia and dry mixed fertilizers. Although he expected far less production, his first year as a blender resulted in the sale of over 600 tons.

The firm's most recent step, completed only recently, was installation of a Barnard & Leas "Autobatch Skid Plant." He has also installed a convertor. Present plans call for eventual transfer of the original blending facilities to a different locality and purchasing new equipment for an additional plant at still another point. This plan will give the Carpenter firm complete liquid fertilizer production facilities at Bondurant, plus blending plants at Alleman and Altoona, Iowa.

Under this plan, the blending plants would receive 8-24-0 liquid product from the Bondurant facility, and the blenders will add potash and other dry materials to meet formulation needs in their respective areas.

At Bondurant, Mr. Carpenter has not yet installed storage for complete solutions. With the new system, he says he can start filling individual orders when the "customer comes in the door and have him on his way in about 15 minutes." However, he has storage for 48,000 gal. of 8-24-0. Other storage includes: one 30,000 gal. rubber-lined acid tank; one 12,000 gal. nitrogen solutions tank, and one 48,000 gal. anhydrous tank.

Bulk storage for potash is sufficient to hold two carloads. Potash storage is in a room directly behind the Autobatch plant. Potash is carried by sweep auger conveyor and bucket elevator—operation of which is controlled from control panel.

Acid is trucked in from Chicago—in 20-ton loads carried in collapsible rubber tanks.

Other equipment includes two bulk anhydrous trucks; three liquid applicators hauled by diesel trucks, and a truck equipped with boom. About 50% of the customers in Bondurant area handle their own application. Mr. Carpenter has available for their use a number of 750-gal. nurse tanks.

Lyle Carpenter has built his business on the philosophy of selling a complete fertilizer program. Indicative of the trend toward liquids, he reports that about 80% of his customers use liquids 100%. The average customer in his area used 125 lb. of N and 250 lb. of liquid mixed fertilizer last year, he says.

In Mr. Carpenter's area, a few formulas are particularly popular. These are 5-15-10, 14-7-7 and 10-20-0. However, Mr. Carpenter expects he may be called upon to produce as many as 40 different formulations. He points out that changing formulas is a simple matter with his equipment.

Although the normal operating capacity of his plant is five tons per batch, Mr. Carpenter has set no minimum size of batches to be made. His object is to serve the customer as the customer wants to be served.

In fact, the firm credits its growth to providing good service. For example, when his operators apply anhydrous, the material is injected 12 inches into the ground. Mr. Carpenter, who does all the selling himself, bases his sales approach on the ability of his products and his men to do an exceptionally thorough job.

Fitting into this idea is the eye appeal with which he has installed his new equipment. The gleaming white control panels contrast sharply against wood panels on the walls of the control room center. As the customer enters the main building he can see these white control units through windows on the front of the room. Mr. Carpenter has found a practical way to lend "package appeal" to his bulk liquid product—and the whole installation spells quality.

Mr. Carpenter says he looks forward to a substantial production this year with his new plant. The blending plants were a successful step in his growing operation, but production on these was limited and there was a problem in cool weather because it is difficult to dissolve potash and other dry materials in cold solutions. Under the present system, the heat of reaction puts such materials into solution immediately.

In addition to the blender outlets mentioned, Mr. Carpenter has dealers at Neola and Truro, Iowa.

HOW IT WORKS—Lyle Carpenter (white shirt), describes workings of his new automatic batch mixer to farmer customer. Gleaming white panel board affords impression of cleanliness, accuracy and quality to customers as they come into building. Below, right, is crew with tank truck used to haul materials to customers. About 50% of customers in area apply their own liquid fertilizers. Mr. Carpenter furnishes 750-gal. nurse tanks for their convenience.

SUPERVISORY CONFERENCE — The superintendent's day begins with a huddle with heads of various departments of the Smith-Douglass Streator, Ill. plant. Here Monroe C. ("Dutch") Suderman, superintendent at extreme right, discusses the day's program with his supervisors. From left to right, they are: Norm Hart, maintenance superintendent; Floyd Gross, plant engineer; Bernie Elias, chief chemist; R. J. Kidd, fertilizer superintendent; A. G. Kern, chemical plant superintendent; Brad Grant, sulfuric acid plant superintendent; and Mr. Suderman. Below are scenes around the plant with these supervisors checking further with Mr. Suderman.

Duties Galore . . .

Typical Busy Day for Plant Superintendent

WHAT IS A TYPICAL day like in the life of a fertilizer manufacturing plant superintendent? It is probable, of course, that no two days are precisely the same, but there are many features of a typical day that will ring a bell with superintendents the country over. Checking with foremen, going over production records of the day or night before, planning the next day's output, listening to salesmen and writing reports are familiar jobs.

To picture the day's work of a typical superintendent, Croplife spent a day with Monroe C. ("Dutch") Suderman, superintendent of the Smith-Douglass plant at Streator, Ill. "Dutch" is a graduate of Kansas State University in chemical engineering. He joined Smith-Douglass in 1951 after having been associated with the General Chemical Division of Allied Chemical Corp.

Below and on the opposite page, are photos of highlights of a typical Suderman day in and around the plant.

OUTGO—Fork-lift trucks bringing palletized bags from warehouse to waiting trucks on dock. (At right, above.)

CHECK TEMPERATURES—Dutch Suderman, with writing pad, and Brad Grant, sulfuric acid superintendent, check gauges to determine operating temperatures in H_2SO_4 plant.

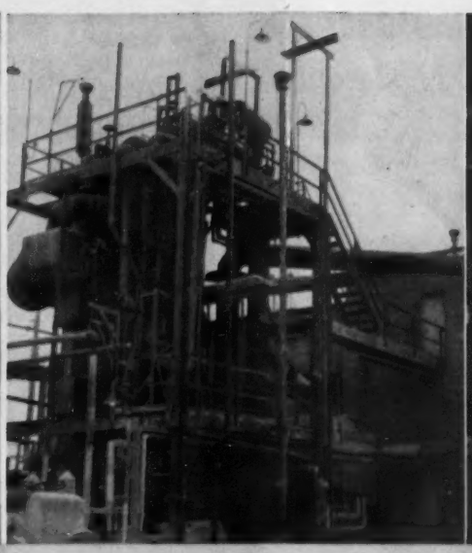
GYPSUM STORAGE—Superintendent's eye-view of gypsum storage area with plant process water lake in foreground. Portion of plant was once brick and tile factory, utilizes excavated area in this manner.

CONTROL PANEL—Mr. Suderman with Clarence Ferguson, superphosphate operator, at control panel of superphosphate plant. Everything under control.

BOILER—New 150-h.p. boiler was recently installed for fertilizer granulation. Here Mr. Suderman examines boiler control records with R. J. Kidd, fertilizer superintendent. It's hot in there, and this visit is short.

PREVIOUS DAY'S OPERATION—With A. G. Kern, chemical plant superintendent, Mr. Suderman reviews previous day's operation of the superphosphate plant at the Streator unit.

THAT PHONE AGAIN!—Mr. Suderman's plant inspection tour seems to be interrupted frequently by telephone calls. This time it is the maintenance superintendent wanting to discuss some changes talked about earlier.



ACID PLANT—(Above) Smith-Douglass contact sulfuric acid plant showing burner, converters and control building. At right (above) Mr. Suderman looks at "Window" where newly-made sulfuric acid may be seen flowing to storage tanks.

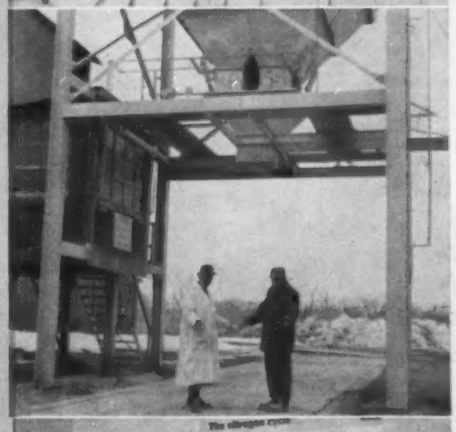
NEEDED: STORAGE—One problem faced by plant is storage of new empty bags. "Where am I going to put more?" Mr. Kidd asks. Mr. Suderman answers by pointing toward the ceiling.

AGITATORS OK?—A. G. Kern and Mr. Suderman inspect agitators in phosphoric acid plant.

FULL HOUSE—Storage bins are nearly all full, and still the stuff keeps coming in! Mr. Suderman and Mr. Kidd check a long row of bins as front-end loader operates swiftly.

KEEPING UP—Bagging department has to work steadily to keep pace with manufacturing. Superintendent checks here to see how things are going.

COST RECORDS—Cris Swanson, in charge of IBM accounting department, M. W. Mawhinney, general manager, and Mr. Suderman inspect figures on production costs. Electronic computers have speeded up work, Mr. Mawhinney says.



NO BUSINESS LIKE NO BUSINESS—Mr. Kidd and Mr. Suderman in gesture of resignment as late season snow (see drift in background) prevented normal movement of plant food. (By end of March, movement was brisk.)

SALESMEN CALL.—Representatives of Service Pipeline Co., J. J. Ashley and Frank E. Butler, tell Mr. Suderman their story toward the end of the day. (At right) Representative from Monsanto Chemical Co., Robert Baynard, (standing) talks with Don Myers, office manager, Roy Brun, sales manager, and Mr. Suderman.

★ ★ ★

HEADQUARTERS of Smith-Douglass Company are at Norfolk, Va., in addition to plants at Norfolk and Streator, the company operates fertilizer units at Danville, Va.; Wilmington and Kinston, North Carolina; Albert Lea, Minn.; Texas City and Houston, Texas; Indian-

Turn to SMITH-DOUGLASS page 29

Two New Pesticide Plants Being Built by Niagara Chemical in Colorado, N. Carolina

MIDDLEPORT, N.Y. — Two new pesticide production units—one at Greeley, Colo., the other at Ayden, N.C.—are now under construction for Niagara Chemical Division of Food Machinery and Chemical Corp. Stuart Bear, division manager, describes the company's decision to build in these two areas as part of an over-all plan to provide "faster, more flexible service to farmers and growers in important U.S. agricultural centers."

The new plants will turn out a wide range of modern insecticides, herbicides, and fungicides, Mr. Bear says. "In addition to producing a number of standard Niagara products, these facilities will make possible the custom blending of formulations designed to meet specific local needs and conditions which might arise."

The Greeley plant will serve all of Colorado and western Nebraska, while the Ayden plant will supply an area comprised of North Carolina, South Carolina, southern Virginia, and the eastern portions of Maryland and Delaware. Slated for completion this spring, both units will contain dust-mixing and liquid-formulating equipment.

Tedion* dusts for controlling mites on fruit crops of Colorado's Junction and Delta areas will be compounded at Greeley. In addition, these facilities will make Thiodan* and ethion insecticides for curbing a wide range of insects attacking the area's vegetable crops—and Niacide* fungicide for use on apples to prevent scab.

Situated in the heart of the tobacco belt, the Ayden plant will make Thiodan compounds and a number of other dusts and sprays for use on this crop. It will also produce formulations for controlling cotton and peanut pests, and for use on vegetables grown in the Delmarva region.

Both new buildings will contain sales offices as well as production facilities and will serve as headquarters for their respective area sales representatives. The Greeley plant will be a cement block structure with a steel roof and the Ayden unit will be principally of steel construction.

The two new plants will bring to a total of 15 the production units operated by Niagara in the U.S. The company also has two each in Mexico and Canada.

*Registered Trademark

Texas Gulf Sulphur To Develop Potash Properties in Utah

HOUSTON, TEXAS — Texas Gulf Sulphur Co. and Delhi-Taylor Oil Corp. have announced an agreement whereby Texas Gulf will acquire and commercially develop Delhi-Taylor's Utah potash properties. Delhi-Taylor will retain a 25% net profit interest in the properties and will receive guaranteed advance net profit payments of $4,500,000 over a four-and-one-half year period. A first payment of $500,000 has been received by Delhi-Taylor.

Texas Gulf Sulphur will have until January 1, 1961 to complete an examination of the technical aspects of the project and it is assumed that commercial developments will begin upon completion of this work.

Delhi-Taylor began the exploration of its extensive southeastern Utah potash properties in 1953 and has maintained a continuous evaluation program since that time. As a result of this program, two large potash reserve areas have been discovered and demonstrated through core drilling. In particular, the Can Creek Anticline Area indicates a long-term, high-grade potash reserve that promises to become a new major domestic source of this vital material, the announcement said.

Chemical Employment Rises in California

SAN FRANCISCO — Employment in chemical manufacturing industries in California held at an even 38,800 wage and salary workers between February and March of this year, which represents an increase from 38,100 for March a year ago, reports the division of labor statistics and research of the California State Department of Industrial Relations.

Production workers in the agricultural chemicals division of the industry increased their average weekly earnings to an estimated $108.66 during March, as compared to $101.94 in February, and $106.87 the previous March. Average hourly earnings were estimated at $2.42, as compared with $2.41 and $2.44 respectively, and the length of the work week was 44.9 hours, 42.3 and 43.8.

ARKANSAS FERTILIZER SALES

LITTLE ROCK, ARK.—Sales of fertilizer in Arkansas during March, 1960 amounted to 68,003 tons, reported the Arkansas State Plant Board. This total compares with 83,695 tons for the same month last year.

PROTECTION—Chemagro Corp., Kansas City, Mo., manufacturer of agricultural chemicals, has introduced a new protective device that prevents scuff damage to its lithographed metal containers while in shipment or storage. Chemagro is using a polyethylene sleeve over the five gallon containers of its products Guthion and Def. The sleeve prevents scuffing and still permits viewing of the label and other information printed on the container. The transparent sleeve need not be removed prior to display by the dealer. The old (left) and the new wrappers are shown in the picture.

Plant Food Institute to Feature Varied Program During Annual June Convention

WASHINGTON — An outstanding array of speakers from the fields of agriculture, education, business and industry will be featured at the 1960 convention of the National Plant Food Institute, at The Greenbrier, White Sulphur Springs, W.Va., June 12-15, Paul T. Truitt, president of the institute, has announced.

Richard E. Bennett of Omaha, Neb., chairman of the institute's board of directors, will preside at the sessions which begin with a morning program on Monday, June 13.

The morning program for June 13 follows: Mr. Bennett, address of welcome; Dr. Clifford M. Hardin, chancellor of the University of Nebraska and president of the American Assn. of Land-Grant Colleges and State Universities; Jim Thomas of Patterson, Ga., president of the Future Farmers of America on "A Future Farmer Looks at His Future in Agriculture"; Arthur H. Motley, New York City, president of the U.S. Chamber of Commerce on "The Political Responsibility of the Business Community," and the annual business meeting of the institute will follow.

The afternoon program for June 13 will be on the subject of the institute's "Chemical Control Project" with Dr. Vincent Sauchelli, chemical technologist for the institute, as moderator. Other participants will include Edwin M. Glocker, W. R. Grace & Co., Washington Research Center; Stacy B. Randle, president of the Assn. of American Fertilizer Control Officials, New Brunswick, N.J.; C. H. Russell, St. Louis, Monsanto Chemical Co.; Jim R. Archer, East Point, Ga., International Minerals & Chemical Corp.; Dale C. Keiffer, Norfolk, Va., Smith-Douglass Co., Inc.; Albert Spillman, Baltimore, Md., Fertilizer Manufacturing Cooperative, Inc.

The morning program for the second day of the convention, June 14, follows: Showing of the institute's new film, "Bread from Stone"; presentation of scrolls to winners in "Soil Management Awards for Editors" contest by Mr. Bennett; Drs. George M. Beal and J. M. Bohlen, department of rural sociology, Iowa State University, speaking on "Dealer Characteristics Survey"; Murray Rennick, Rolla, Mo., Rolla Feed Mills on "What a Dealer Should Know"; Ralph Everett, Miami, Fla., sales training consultant, on "Everything Depends on Sales," and the annual banquet will be held in the evening.

Twelve new directors and officers of the institute will be elected at a meeting of the board of directors Wednesday morning, June 15.

Committee chairmen for the convention will be: memorial, Hugo Reimer, Los Angeles; hospitality, Mr. and Mrs. William M. Clines, Los Angeles; ladies', Mrs. J. D. Stewart, Jr., Anchorage, Ky.; men's golf, W. R. Morgan, New York City; ladies' golf and putting, Mrs. L. Ralph Boynton, Bronxville, N. Y.; tennis, W. E. Jaqua, Richmond, Cal.; horseshoe pitching contest, A. A. Schultz, Reading, Pa.; skeet, T. F. Bridgers, Wilson, N.C.; bridge and canasta, Mrs. Jack B. Snyder, Topeka, Kansas; prizes, Mrs. Dean R. Gidney, New York City.

The nitrogen and potash producers will sponsor hospitality hours on Monday and Tuesday afternoons (respectively).

VETERAN RETIRES

PITTSBURGH, PA.—Roy E. Campbell, a veteran of 31 years with the company, retired recently as director of advertising and sales promotion for Joy Manufacturing Co., manufacturer of mining, construction and industrial machinery.

Assigned to New Canadian Position

CHICAGO—Mervyn A. Upham has been named operations manager for International Minerals & Chemical Corp.'s potash mine in Canada.

Mervyn A. Upham

International is sinking a 3,100-foot shaft near Esterhazy, Saskatchewan, into what the company describes as the largest known deposit of high-grade potash in the world.

A 14-year veteran of Canadian underground mining, Mr. Upham was mine manager of Rio Tinto's $28-million Milliken Lake uranium mines and plant before joining IMC last March.

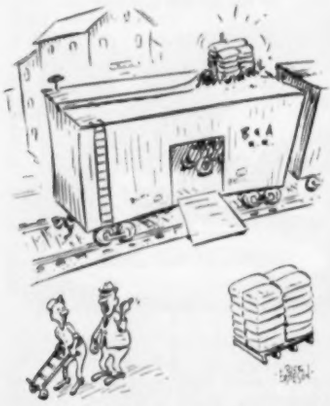
He is a graduate of Mount Allison University and received his engineering degree from Queens University in 1941. During World War II he was a captain in the Royal Canadian Engineers and saw service in the European and North African theaters.

Mr. Upham succeeds Merton I. Signer, who directed the initial phase of the Esterhazy mine development. Mr. Signer recently was assigned to a similar project in IMC's long-range planning division at the corporation's headquarters in Skokie, Ill.

Fire Destroys Plant

ALLENDALE, S.C.—Fire of undetermined origin has destroyed the plant of the Ti-Ti Peat Humus Co. The buildings, machinery, two tractors, containers and other supplies were lost.

The company had just recently been restored after being damaged by Hurricane Gracie and was in full operation at the time of the blaze, according to George E. Bryan, manager.

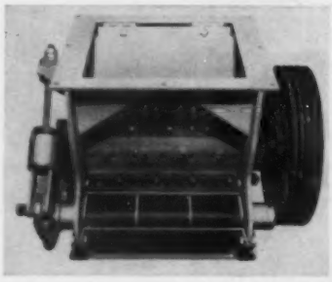


"Go tell him he's stacking 'em too high."

What's New?

Additional information is available about new products, new services, and literature described in this department. Circle the numbers of items on which you desire more information, fill in your name, your job title, your company's name and address on the card. Then clip it out of the page and mail. No postage is necessary.

No. 9202 Belt Weigher Bulletin



A pneumatically-operated belt (stream) weigher for the continuous weighing of dry materials at low to medium rates is the subject of a bulletin published by B-I-F Industries, Inc. The Omega Pneu-Weigh, Model 36-20-W, is used for feed and flour mills, fertilizer and chemical plants, the company says. It has a range of 10:1 with constant speed drive and 50:1 with variable speed belt drive. It has a capacity of 0 to 3,000 lb. a minute. A pneumatic sensing device makes the feeder adaptable for recording, pacing and controlling other equipment. The bulletin contains a photo of the unit, lists its advantages and describes its operation and accessories. For copies, check No. 9202 on the coupon and mail.

No. 9201—Single-Roll Crusher

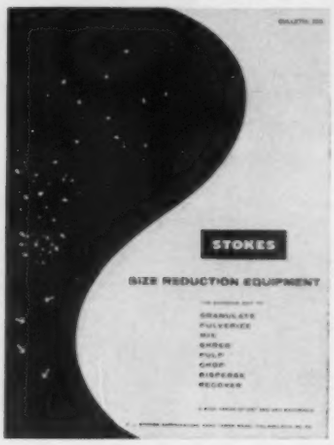
C. O. Bartlett & Snow Co. announces the Triumph single-roll crusher designed for reducing any friable material, even if the material is mixed with noncrushable matter. According to the company, the unit can be used for material which has a tendency to cake or become encrusted in processing. Tramp metal, rocks, stones and other foreign particles pass through without damaging the machine, the company says. An air-cushioned breaker bar serves as a release mechanism for foreign bodies in the material, and it absorbs shock overloads to prevent strain on the wearing parts of the crusher. Only 15 to 20 h.p. are needed to power the crusher to handle from six to 10 tons of 10 lb. per cu./ft. material in an hour. Check No. 9201 on the coupon and mail for details.

No. 9154—Vibration Inducer Catalog

Martin Engineering Co., announces a 38-page catalog which provides engineering data, specifications and a price list on the "Vibrolator" line of vibration inducers. It lists 52 sizes and types from the BD-10 (4½ oz.) to the 3,000 lb. impact CCVP series hopper car shaker (72 lb.). Included in the catalog is an instruction sheet on the CCVP series, illustrating how motor can be replaced in three minutes or changed from air to electric or hydraulic power source. Also shown is a forced air cooler "Moto-magnetic" electric vibrator of adjustable frequency for use where difficult ambients are a problem. For copies, check No. 9154 on the coupon and mail.

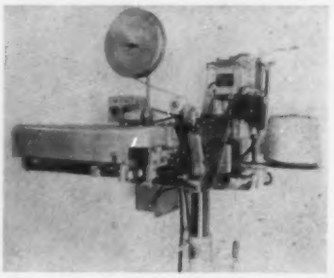
No. 9180—Equipment Bulletin

Size-Reduction equipment is described in a four-page bulletin, No. 350, made available by the F. J. Stokes Corp. The "Tornado" mill, a whirling-blade vertical-flow granulator, is covered in the bulletin, as well as the Model 43-B Oscillating Granulator. Complete specifications for the two sizes of Torando Mill now available are given. For copies, check No. 9180 on the coupon and mail to this publication.



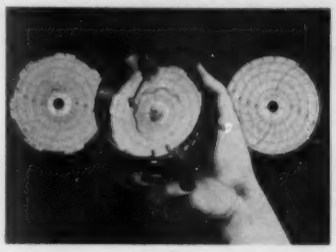
No. 9200—Bag Closing Machine

A Thermoplastic Tape-Top bag closing machine, designed to apply a thermoplastic tape closure over sewing on open-mouth multiwall shipping sacks, has been announced by Bemis Bro. Bag Co. The machine effects a bag closure providing maximum protection against contamination from outside particles, prevents infestation of bags and eliminates sifting of fine products, the company says. The closure creates a moisture barrier to prevent "caking" of hygroscopic products and retains its physical and chemical characteristics over the full range of temperatures encountered in bagged products. The unit utilizes a special tape which is economical in cost and provides maximum strength with respect to tensile and tear, the company says. For details, check No. 9200 on the coupon and mail.



No. 9141—Recording Thermometer

The Pacific Transducer Corp. announces a recording thermometer with dry stylus. The thermometer can be used in a number of industries, including food, chemical agriculture, research and others. For recording temperatures of liquids or wet environments, the instrument can be encased in a polyethylene bag. The unit utilizes a dry scriber. The thermometer uses a spring wound clock movement and is made in two different time ranges, either 20° F. to 220° F., or minus 40° F. to 160° F. For details, check No. 9141 on the coupon and mail.

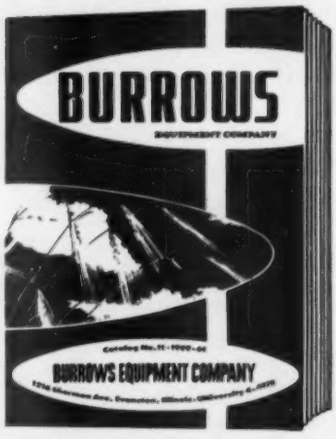


No. 9185—Pneumatic Check Valve

A hydraulic and pneumatic check valve, called the "Quality Seal," has been announced by Quality Control Corp. According to the company it has wide application in all types of hydraulic and pneumatic systems. The valve features a compact design and is small and light in weight. It is designed to allow full flow at operating pressures up to 3,000 PSI, with a minimum pressure drop, and to provide quick opening and positive closing. A seal ring with a dual seating action is used to guarantee a leak proof valve, the company says. For details, check No. 9185 on the coupon and mail.

No. 9132—New Catalog

A new equipment catalog has been published by Burrows Equipment Co. The catalog, No. 11, comprises a source of equipment and supplies for materials handling in industry. According to the company, the catalog is bigger than ever and contains information about a number of new items. For a free copy, check No. 9132 on the coupon and mail.



Send me information on the items marked:

- ☐ No. 9132—New Catalog
- ☐ No. 9141—Recording Thermometer
- ☐ No. 9154—Vibration Inducer Catalog
- ☐ No. 9180—Equipment Bulletin
- ☐ No. 9185—Pneumatic Check Valve
- ☐ No. 9200—Bag Closing Machine
- ☐ No. 9201—Single-Roll Crusher
- ☐ No. 9202—Belt Weigher Bulletin

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Natural organics in SMIROW tankage will grow tobacco like this . . . with smooth, even texture . . . well-filled out leaves from top to bottom.

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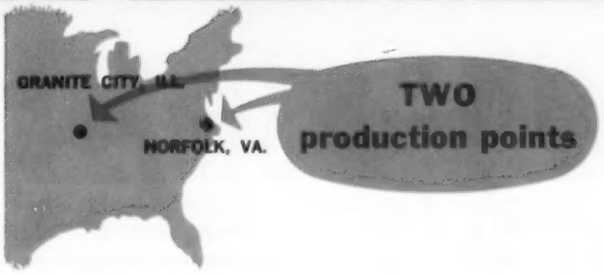
has these advantages:

- Eliminates fire hazard • 100% organic
- Faster service from two production points
- Continuous supply will reduce expensive inventory • Uniform in color and texture
- Prevents allergy-dust problems



Natural organic nitrogen is nature's own way of supplying nitrogen to plant life. Don't cut the quality of your organic nitrogen in premium grades of mixed fertilizer.

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Be *sure* your tankage requirements will be filled. Let us figure the cost of SMIROW delivered to your plant . . . from either Norfolk, Va., or Granite City, Ill. Faster service to tobacco and citrus belts from the two closest major production points.

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In mixed fertilizer or applied direct, SMIROW provides long, continuous feeding to citrus. Not a synthetic, but 100% natural organic—SMIROW allows controlled release of plant nutrients.

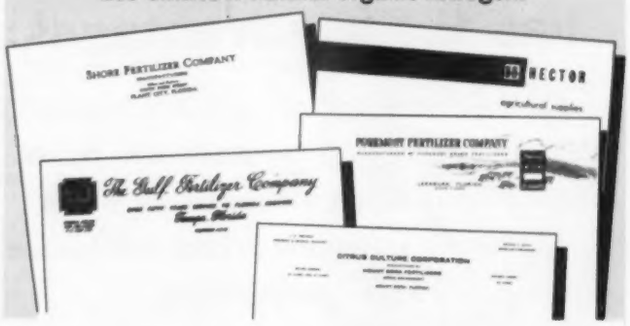
Order SMIROW for your citrus fertilizer and get these extra benefits:

- Eliminates fire hazard • 100% organic
- Faster service from two production points
- Continuous supply will reduce expensive inventory • Uniform in color and texture
- Prevents allergy-dust problems

Be sure your tankage requirements will be filled

Let us figure the cost of SMIROW delivered to your plant . . . from either Norfolk, Va., or Granite City, Ill. . . . two locations convenient to tobacco and citrus areas.

Each year, more and more fertilizer manufacturers use SMIROW natural organic nitrogen.



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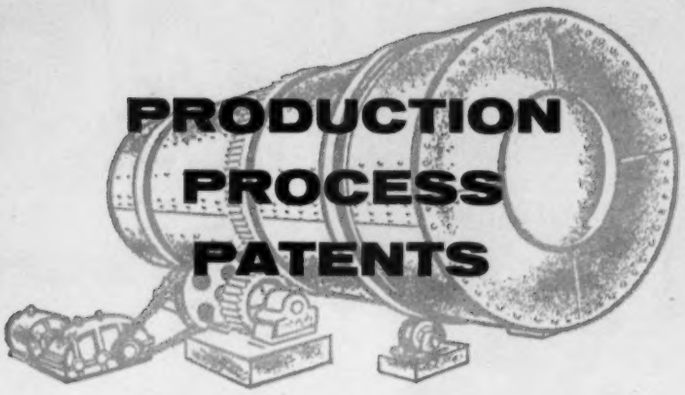


2,932,362

Dust Collector and Element for Use in Same. Patent issued April 12, 1960, to George William Roper, South Bend, Inc., assignor to Wheelabrator Corp., Mishawaka, Ind. In a dust collector, a filter element adapted to be arranged across the path of a gas to be filtered so that gas enters the filter on one side and passes out of the filter on the opposite side, said element being formed of a fibrous fabric and finely divided, electrically conductive graphite particles present in an amount within the range of about 0.0005 to 0.005 pound per square foot of surface area on the outgoing side of the filter fabric.

2,933,377

Process for Making Non-Caking and Free-Flowing Sodium Nitrite. Patent issued April 19, 1960, to Cecil J. Doubt, Hagerstown, Md., and Henry R. Nelson, Pennsville, N.J., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. A process for converting granular sodium nitrite to a non-caking, free-flowing form which comprises first adjusting the moisture content of the granular salt to about 2 to 9% water by weight, forcing the moisture-adjusted salt through a die having a multiplicity of generally circular openings, slicing the strands emerging from said die into segments having lengths the majority of which are not more than about three times the cross-sectional diameter of the strand in each instance, and drying the pellets thus obtained to a moisture content which is sufficiently low so that the pellets will not crumble when stored, said final moisture content after drying being less than about 1.5% by weight.

2,933,527

Process for the Manufacture of Urea in Granular Form. Patent issued April 19, 1960, to August Guyer, Zurich, Fritz Marti, Basel, and Tadeusz Sztachelski, Visp, Switzerland, assignors to Lonza Electric and Chemical Works Ltd., Basel, Switzerland. A process for the manufacture of substantially dry free-flowing granules of urea containing less than 1% of biuret by weight from an aqueous urea synthesis effluent substantially free of unconverted ammonia and carbon dioxide: consisting essentially of passing said aqueous urea effluent through an evaporative heating zone; introducing gaseous ammonia into said heating zone; rapidly heating said aqueous urea effluent during its passage through said zone and in the presence of said gaseous ammonia at a temperature below about 180° C. and for a time sufficient to form a concentrated urea effluent containing at least 97% urea by weight; immediately thereafter passing said concentrated urea effluent through a cooling zone wherein said effluent is cooled to a temperature within a few degrees above its crystallization temperature; immediately thereafter commixing said cooled concentrated urea effluent with cool solid urea fines whereby said cooled effluent is rapidly cooled to below its crystallization temperature and additional water is evaporated by the heat of crystallization; and intimately mixing said mixture until granulation thereof to form the dry free-flowing solid urea granules containing less than 1% of biuret and less than 1% of water by weight.

2,933,526

Process for the Manufacture of Urea in Granular Form. Patent issued April 19, 1960, to August Guyer, Zurich, Fritz Marti, Basel, and Tadeusz Sztachelski, Visp, Switzerland, assignors to Lonza Electric and Chemical Works Ltd., Basel, Switzerland. A process for the manufacture of substantially dry free-flowing granules of urea from an aqueous urea synthesis effluent substantially free of unconverted ammonia and carbon dioxide: consisting essentially of passing said aqueous urea effluent through an evaporative heating zone; rapidly heating said aqueous urea effluent during its passage through said zone at a temperature below about 180° C. and for a time sufficient to form a concentrated urea effluent containing at least 97% urea by weight; immediately thereafter passing said concentrated urea effluent through a cooling zone wherein said effluent is rapidly cooled to a temperature within a few degrees above its crystallization temperature; immediately thereafter commixing said cooled concentrated urea effluent with cool solid urea fines; and intimately mixing said mixture until granulation thereof to form the substantially dry free-flowing granules of urea.

Chemical Plant Sold

RITZVILLE, WASH. — Inland Chemical Co., Inc. has sold its fertilizer plant and franchise to Welch Bros. of Connell, Orville Moeller, manager, announces. Welch Bros., a Connell fertilizer dealer for the past 12 years, already has taken over the local operation. The firm has retained Bob Ott, who joined Mr. Moeller this spring from Moscow, Idaho, as its Ritzville manager.

Formulation Information . . .

Diluent Properties And Their Effect on Pesticidal Products

By Jack Watson

J. M. Huber Co.
New York

SINCE the advent of DDT during World War II, followed by the continuous development of other complex chemical pesticides to supplement the earlier sulfurs, arsenicals and coppers, most modern pesticidal chemicals are marketed as highly-concentrated materials and in a physical form requiring further treatment and dilution to permit effective and economical application.

To reduce these chemicals to field strength, many carriers and diluents are available in both solid and liquid form. As a dust, the diluted pesticide is applied as a powder. As a spray, the technical chemical may be converted to a wettable powder for later dispersion in water, or put into solution form, or in emulsion form. In making dust, for additional economy and practical processing and storage reasons, an intermediate concentration (dust base) is usually prepared, with final dilution to be made at a later date. Solid diluents (powders) are usually termed "carriers" when used in the intermediate stage, and "diluents" when used for final reduction.

Although solid carriers and diluents generally are considered to be inert, they usually constitute more than 80% and up to 99% of the finished dust, hence their physical properties are recognized to be of high importance in the preparation and application of pesticide compounds.

In the United States, many minerals, loosely called "clays" are used. Kaolinites, talcs, pyrophyllites, attapulgites, diatomites and montmorillinites present the biggest volume. Other oxides and silicates and some carbonates are also used sometimes for their properties but more often because they are locally available at low cost. Sulfur is used in large quantities in cotton dusts and sprays for its pesticidal value but since it may represent up to 40% of a cotton dust, it occupies the role of a diluent also.

A new group of synthetic carriers, hydrated silicas and silicates, has been developed in recent years. They are used chiefly as carriers for high level wettable powders and dust bases (such as 75% DDT; 75% dieldrin) but also find application at other levels because of their high absorbency and very low bulk densities.

Attapulgites, kaolinites, diatomites, montmorillinites are the chief carriers in tonnage today, although the synthetic carriers are moving up rapidly. Kaolinate, talc and pyrophyllites are the major diluents with sizable quantities of calcium carbonate coming into use. Certain air-floated kaolines find wide application as both carrier and diluent. Their physical properties are suitable as carriers, and together with their low cost they are suitable also as diluents.

The synthetic materials are likely to fill a rapidly expanding role in the U.S. picture. While more costly than natural minerals, they can effect substantial savings and processing time, storage space and freight costs.

Factors of importance in carrier diluents to the formulator are sorptivity, suspension, adhesiveness, compatibility, density, abrasion, and mortality. The correct balance of these factors is not found in any one material, although certain kaolinites come close to the ideal material. Usually two or more clays are combined to obtain suitable or acceptable properties. At times certain properties may be sacrificed in favor of lower costs obtained from local clays or other materials.

Blending and Grinding

Equipment and techniques do not differ particularly with various clay types, but the type of grinding mill used can influence the results obtained from various clays. Quite a few formulators in the U.S. have air mills (fluid-energy mills) which are necessary to obtain the very fine grinds (minus two microns) in 75% DDT and dieldrin wettable powders exported to tropical regions for control of malaria. Very intimate dispersion and fine particle size are requisites to withstand the rigors of high heat and high pressure without caking during transit and in tropical storage.

On the other hand, 75% DDT can be made satisfactorily for domestic use on roller mills or vertical hammer mills. Ordinary attrition mills such as the screen hammer mill serve very well for the whole level of concentrates and for grinding finished dusts.

In 75% DDT and dieldrin, and in lower concentrate levels of some other pesticides, it is necessary to use extremely fine particle size and highly absorbent materials. In lower concentrations, such as 50% DDT, diatomites, attapulgites, or montmorillinites or combinations of one of these with kaolinite, a fine particle size is used.

If sufficient grinding action is available, a fine kaolinite can be used alone, or with a small amount of more absorbent clay. Intensive grinding action can reduce kaolin agglomerates to near ultimate particle size exposing enormous surface area for adsorption. The higher suspension of kaolinite is an extra advantage in wettable powders.

Sorptivity

Carriers may be absorptive or adsorptive, attapulgites, diatomites and montmorillinites are generally considered absorptive, able to hold liquids eternally. Kaolinite has no internal structure available, but has high ability to hold liquids on its surface. Synthetic silicas and silicates are ultra-fine in particle size, but it is not clear whether they are truly absorbent or just appear to be because of the vast amount of pore or void structure in particle agglomerates. In any case, they provide extraordinary surface area.

Many of the pesticide chemicals are liquid or waxy and must be taken up completely with the carrier to provide a dry, free flowing powder. Talcs and pyrophyllites have comparatively little liquid-holding ability, but find wide use as final extenders in field-strength dusts. Kaolinites also are widely used as diluents since their particle size and shape usually provide better deposit and retention in field applications.

Adhesiveness

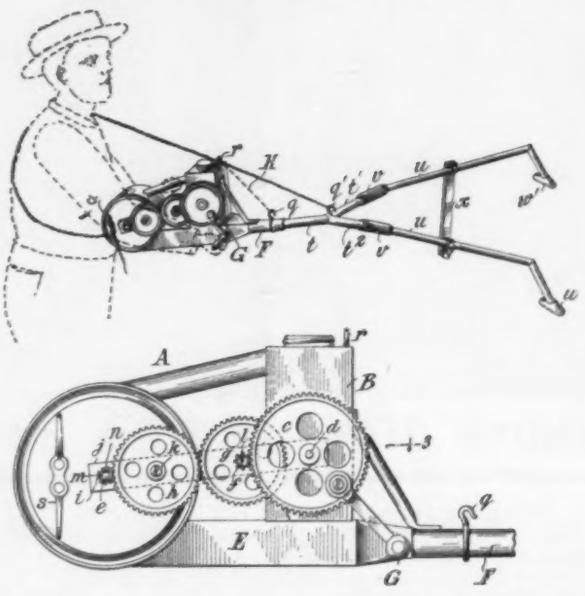
There are differences in the ability of various diluents to provide satisfactory dust deposits. But a high dust deposit is meaningless if mechanical losses due to rain, wind and rubbing of foliage, nullify the dust or spray treatment. The plate-shaped kaolinite particle appears to provide better retention as well as better deposit. Under some operating conditions, the addition of a small amount of heavy density diluent such as pyrophyllite or kaolinite will provide optimum results.

Suspension

In wettable powders, which are eventually diluted with water for a field application, easy dispersion and good suspension of the powder are paramount. Surface active agents are included in the powder to facilitate dispersion and suspension; they are costly, need careful selection for specific toxicants and carriers, may cause excessive foaming or other disadvantage if used improperly or to excess. The carrier should have inherently good wetting and suspension properties to minimize the use of these supplementary agents.

There are marked differences in suspendability between various clay types and even among clays of the same type. Very small amounts of surfactants should be needed for the

Saga of Insect Control



A FAIRLY COMPLICATED but apparently effective insecticide applicator was patented in 1909 by one Clinton H. Leggett, New York City, for the purpose of enabling an operator to distribute powdered insecticide over several rows of plants at the same time. The device was made adjustable so that nozzles might be altered to conform to rows of plants at different spacings.

The inventor avoided the use of sprockets, chains or belts, he said, because he wanted to keep the device simple. So he provided a series of gears which secured their power from the handle (G) in the drawing. A fan at the rear section of the machine, next to the operator, was to blow the dust through the tubes and out of nozzles W and W′ and thus get at the plant-infesting bugs.

Lubrication of the moving parts is described by the inventor who recommends use of a "small piece of leather to be held in place around the ends of the shafts and occasionally well supplied with oil." This, he said, would provide "a continuous and proper lubrication of the shafts."

The machine, which appears to be rather heavy, was supported by a small rope which looped the operator's neck and shoulders.

Illustrations shown here are the official ones in connection with securing the patent papers.

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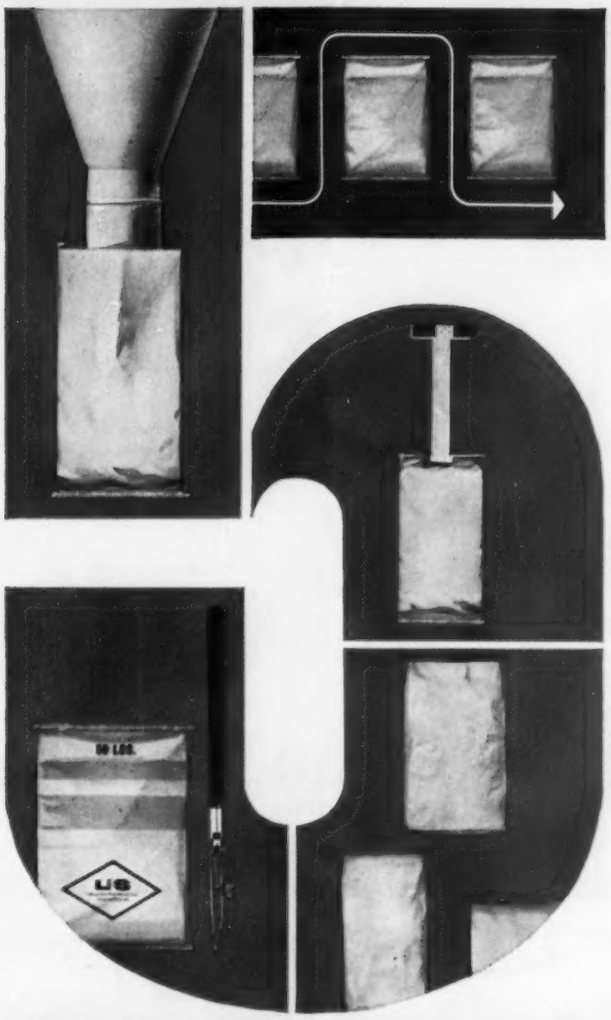

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carrier, often little or none beyond that needed for a suspension of the toxicant itself.

The quality of grinding and making wettable powders is highly important. Agglomerates must be reduced, the toxicant must be well distributed on the carrier, the surfactants uniformly distributed, and the ultimate powder be as fine as possible to avoid hard cake or re-agglomeration in storage. These points are interdependent and together are essential for optimum results in wettable powders.

When clays are peptized they do not settle in a normal manner, hence it is necessary to determine if the surfactants selected for the pesticide material are also beneficial or detrimental to the carrier employed.

Abrasiveness

In air mills and other costly grinding equipment, abrasion wear and clogging due to grit are expensive and time consuming. Also serious is the wear loss due to abrasion of pipes, nozzles, and ventura in dusting and spraying equipment. Carriers and diluents should be selected in grades which have the finest particle size and lowest screen residue.

Density

Bulk densities of carriers and diluents vary all the way from three pounds per cubic foot to 90 lb. per cubic foot. The lighter bulk densities are preferable for wettable powders and dust basis, while medium bulks are best for field strength dusts. A kaolinite density is considered to be medium, provides good "ground roll," high deposit, and not with excessive drift. Aircraft operators often prefer higher densities for greater loading capacity on each trip, so many dusts are formulated with kaolin plus talc, pyrophyllite or calcium carbonate to give desired densities. Protective covering (deposit) may be sacrificed if density is too high. (Too much falls to the ground.) If it is too low, drift loss is too high in case a breeze is blowing.

Compatibility

Most clays and other minerals and manufactured silicas and silicates have been used safely over the years. In recent years, some extremes in storage or grinding temperatures have occasioned breakdowns of some of the chemicals, or phytotoxicity on some plants. The difficulty is now attributed to highly acidic or basic sites on the surfaces of carriers and diluents. Some chemicals are more sensitive to this condition than others and the phosphates appear to be the most sensitive group.

Various deactivators are recommended by the manufacturers of the chemicals including urea HMT (hexamethylenetetramine), certain glycols and lignosulfonates, which appear to neutralize or control the chemical activity of the clays. The various clays appear to have different reactivity with different pesticide chemicals, and there is no one deactivator that is useful with all chemicals. Thus, it is impossible to generalize.

Pesticide chemical manufacturers offer their recommendations for suitable carrier/diluents, deactivators and amount for each chemical on their list. In a broad sense, it can be said that attapulgites, montmorillinites, and diatomites need more deactivators than kaolinite, while talcs and pyrophyllites may need the same or even less than kaolinites. In some cases, talcs and pyrophyllites are perfectly safe where others may cause trouble.

In practical experience, most of the sensitive chemicals have been widely used with the so-called "reactive" carrier/diluents, without deactivation and without causing trouble. Excessive storage temperatures or even high grinding temperatures may provide the conditions needed to start reactivity. During summer weather in some of the southern states, closed freight cars and warehouses can reach temperatures well above 120° F.

Mortality

Carriers and diluents are usually considered to have no insecticidal powers in themselves, yet many do have some lethal power, possibly due to starvation (food barrier, digestive clogging, etc.), desiccation (aridity, adhesiveness, fineness of dust, etc.) and others. A study of some 60 carrier/diluents at Cornell University some ten years ago was made on Mexican bean beetle larvae, without addition of toxicant chemicals. Results were expressed as percent mortality, and the data classified by mineral groups.

There were wide differences between groups and within groups. Mortality of 16 talcs range from 0% to 60%; 5 pyrophyllites from 0% to 20%; 5 montmorillinites from 0% to 65%; 8 kaolinites from 6.6% to 99.9%; 2 attapulgites, 60% and 75%; 2 diatomites, 70% and 85%. The other miscellaneous minerals and botanicals range from 0 to 65%.

A quite recent and continuing study at the University of California, testing some 200 minerals, covered the exposure of dry wood termites and German cockroaches. Initial data indicates high potency on the cockroach of a silica gel treated with a fluoride.

In summary, a number of clay minerals, and some other mineral groups akin chemically or physically, are widely used as carriers and/or diluents in the preparation of pesticide chemical formulations. Some manufactured silicas and silicates find use in limited applications but hold promise of wider use to achieve better results and greater economy.

The various materials differ in a number of important properties so that a combination of two or more is usually made to achieve desired balance in a formulation. The major properties of importance have been outlined in this article and some indication is given of the usefulness of each mineral type in pesticide formulations.

Larger Pasture Spraying Programs Seen in Arkansas

LITTLE ROCK, ARK. — Enlarged pasture spraying programs in many counties are expected to help increase herbicide sales in Arkansas, according to industry and agricultural officials.

A large number of counties will have custom weed sprayers available to farmers as part of a program to control bitter weeds and other obnoxious plants in pastures.

Much of the work will be supervised by the Soil Conservation Service. The spraying program is already underway in some counties in the southern part of the state.

Arcadian® News

Volume 5 | For Manufacturers of Mixed Fertilizers | Number 5

How to Make Your Plant a Safer Place to Work

You can make your fertilizer plant a safer place to work. Take hazards out of production and build safety into your manufacturing processes!

Disregarding safety for the sake of production short cuts just isn't good business sense. It is imperative to protect your employees and yourself from accidents. Fortunately, the safe way is usually the most economical way to produce fertilizer.

Plan now to eliminate conditions in your plant that might cause costly accidents. Look at all phases of your operation—large and small.

Accidents can happen to anyone suddenly faced with an unusual situation—or, an injury may even occur during the performance of routine duties. For example, an old friend and frequent enemy of man—the ordinary ladder—is still a prime contributor to worker injuries. Ladders alone cause approximately 40,000 painful falls each year. Time lost on the job from ladder injuries can be serious and expensive for employee and employer alike. Fatalities are tragic.

Most accidents with men, equipment and materials can be avoided. Through only a little effort and cost, plant situations that might cause accidents can be foreseen and eliminated.

But this is only one phase of the safety problem. As chemical processing increases in fertilizer manufacturing, more production hazards are created. To be safe, you should know what is going on, chemically, at all times in your plant.

Good safety records usually result from the following:

1. Serious efforts to eliminate dangerous conditions in the plant.

2. Thorough training of personnel in safe work practices.

It might pay you to carefully examine your own plant, keeping in mind the following check-list:

A. Many accidents are caused by poor operating conditions. Bad equipment or poorly-trained workers can lead to combining wrong ingredients that will bring real trouble. Some examples:

1. *Increasing the amount of acid to control ammonia fumes, when there is no good reason for these fumes.*

2. *Use of abnormally high amounts of acid to obtain heat when some of this heat can be added in the dryer.*

3. *Or, creating too much heat in the dryer to achieve results that could be partially or fully accomplished through safer channels.* (continued on following page)

HOW TO MAKE YOUR PLANT A SAFER PLACE TO WORK

(continued from preceding page)

4. *Allowing too many shields or ventilation that deprive the operator of a ready means to detect hazardous conditions.*

5. *Use of gas masks during all normal operating time. This may deprive personnel of distant or early warnings. There is something seriously wrong when regular operators are required to wear gas masks constantly. However, safety goggles should be worn everywhere throughout work periods.*

B. Proper respect should be given to actions of chemicals, heats and pressures on eyes, lungs and skin, as well as on metals, rubbers and organic materials. Common abuses are:

1. *Delaying medical attention for accident victims.*

2. *Handling acids without goggles and rubber gloves, or ammonia without gas masks.*

3. *Using low-pressure diaphragms with anhydrous ammonia.*

4. *Using rubber in gaskets, valve diaphragms and hoses that conduct sulfuric acid. Some synthetics are suitable for use with sulfuric acid, and the supplier should be consulted about their adaptability. Good grades of rubber are suitable for phosphoric acid.*

C. Applying high heat to equipment that has not been cleaned thoroughly can cause explosions. This carelessness still is a perennial source of accidents, some of them fatal.

D. Handling acids, particularly sulfuric acid, is dangerous. Detailed instructions are available from acid suppliers. They should be posted conspicuously in the plant, and followed to the letter. Some precautions are:

1. *Avoid all contacts with the body.*

2. *Get medical attention immediately when there is an accident.*

3. *Flush affected areas with clean water for at least 15 minutes.*

4. *Use water at low pressure for the eyes.*

5. *Always wear suitable goggles and headgear, preferably a safety helmet, around all acids. Add rubber gloves, full face shields, rubber safety shoes, and approved clothing when dangers are great.*

E. Sulfuric acid releases hydrogen when it reacts with ferrous metals. When this action takes place in a closed vessel or piping, very high pressures can develop. Hydrogen is also a serious fire and explosion hazard over a wide range of mixtures with air. Some things to remember:

1. *Steel is a suitable material for handling sulfuric acid at and above 77% concentration (60° Be) with some exceptions.*

2. *Moisture added to the acid even from the air will greatly increase its corrosive power.*

3. *Corrosion of steel piping is greatly increased when the velocity of sulfuric acid in the piping exceeds 10 feet per second, or about 9 gallons per minute in 1¼ inch extra-heavy steel pipe.*

F. Furnaces cause many accidents. Establish safe starting and shutdown, particularly for gas furnaces.

G. It is unsafe to have large quantities of acid under pressure in the plant. Use pumps instead of air pressure.

H. Watch out for the release of dangerous chemicals in large volume. Use safe hose connections that are usually not quick-acting.

I. Exercise care in the combination of combustible materials, including mixed fertilizers.

J. Practice good housekeeping:

1. *Build guards around all chains, gears, belts and exposed moving parts.*

2. *Insulate wiring and guard light bulbs.*

3. *Disconnect piping of dangerous materials for repair work.*

4. *Use lock-outs, interlocks and remove fuses of electrical equipment for repair work.*

5. *Maintain adequate lighting.*

6. *Keep ladders in good condition, and see that employees are trained in their use.*

7. *Maintain enough pressure gauges in proper condition.*

8. *Have safety valves in good working order, and placed correctly.*

9. *Keep your gauge glasses guarded.*

10. *Locate overflow and discharge devices safely.*

11. *Maintain escape routes for personnel.*

12. *Provide a safe means for obtaining samples.*

13. *Make sure tank cars can be connected safely.*

14. *Keep floors as dry as possible. Post signs to warn employees about wet, slippery floors.*

Now is a good time to check over your manufacturing operation to see if your plant is a safe place to work. You probably will discover some ways to produce fertilizer more efficiently and at lower cost. However, remember to look carefully at all attractive short cuts. They could be dangerous!

4-H CLUB and F.F.A. ACTIVITIES sponsored by Nitrogen Division

5 YEARS with 4-H

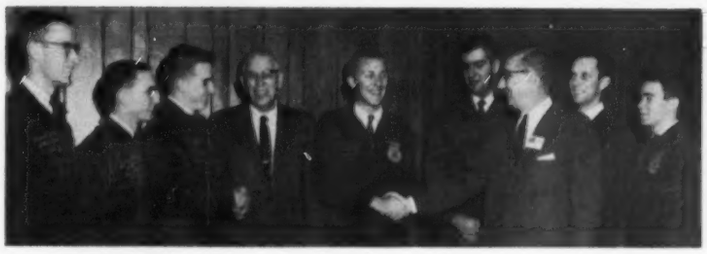
Nitrogen Division marks 1960 as the fifth consecutive year of sponsorship of the National 4-H Field Crops program. During that time approximately TWO MILLION young men and women learned modern farming skills through participation in the Field Crops program. These young people kept detailed records of expenditures and cultural practices, ran comparison tests, and worked always to "make the best better." The National Committee on Boys and Girls Club Work, located in Chicago, acts as the liaison agency between donors and the Federal and State Extension Service, which operates the program. As a donor, Nitrogen Division provides six $400 scholarships to the national winners, all-expense trips to the annual 4-H Club Congress to state and national winners, and a maximum of four gold medals to county winners. In addition, the Division helps finance efforts to enroll more members in Field Crops, and is hard at work revising the local leaders' manual to place more emphasis on soil fertility testing.

7 YEARS with F.F.A.

Nitrogen Division has contributed to the Future Farmers of America Foundation for seven consecutive years. Division headquarters in New York is always a principal stop on the annual good-will tour of the national officers of FFA. This year the officers demonstrated keen interest in an illustrated talk by Dr. Harvey Stangel, chief agronomist for Nitrogen Division. This farm youth group, with a current membership of 380,000, is open only to boys studying vocational agriculture in high school. The FFA and the vocational agriculture program are administered by state departments of education and the U. S. Office of Health, Education and Welfare.

John Coverdale (left), president of the National Committee on Boys' and Girls' Club Work, presents National 4-H Donor Merit Award to Jacob White, president, Nitrogen Division, Allied Chemical. The award denotes 5 years' sponsorship in the National 4-H Club Field Crops Program.

The six national 4-H Field Crop winners line up with an oversized loaf of bread showing the share of the consumer's bread dollar that is paid to the grower of the grain. Each of the winners received a $400 college scholarship from Nitrogen Division, Allied Chemical.



National officers and advisors of the Future Farmers of America were guests of Nitrogen Division in New York on their annual good-will tour of the U.S. With the boys are Jacob White, president, Nitrogen Division, Allied Chemical, and Frank J. French, president, General Chemical Division.

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	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60° F	Approx. Vap. Press. at 104° F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	-108

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Omaha 7, Neb., P. O. Box 166	Bellevue 1464	Memphis 9, Tenn., 1929-B South 3rd St.	Whitehall 8-2692	St. Paul 14, Minn., 764 Vandalia St.	Midway 5-9141
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How to Overcome Problems . . .

Liquid Fertilizer Makers Can Take Steps to Beat Corrosion

By W. W. Arnold*

CORROSION OF A METAL may be defined as the destruction of the metal by chemical or electrochemical action. Typical chemical destruction may be illustrated by the action of ortho-phosphoric acid on a steel tank. Essentially, the steel tank is "eaten" by the acid through an exchange of ions between the steel and the acid.

Salts in solution can also be a destructive force, and this is of particular consequence when the liquid contains high salt concentrations such as found in liquid fertilizers. In general practice phosphoric acid is neutralized with ammonia forming mono- and di-ammonium phosphates. To this solution is often added more nitrogen in the form of ammonium nitrate and urea, and potassium usually in the form of potassium chloride. It is quite obvious then that anyone handling this type of chemical solution has on his hands a rather formidable collection of corrosive salts even though the fertilizer solution may be in a neutral state.

Electrochemical (or galvanic) corrosion is another very important factor to be taken into consideration in storing, manufacture and use of liquid fertilizers. Electrochemical corrosion occurs when two dissimilar metals are in contact with each other in the same liquid. The result is that one of the two metals, the more active, is corroded, the less active is not corroded but rather is actually protected from corrosion because of the electrochemical action. It is for this reason that brass or bronze, active metals, should not be used in conjunction with aluminum or steel, and why stainless steel, a very inactive metal, will not be corroded easily by electrochemical action.

Similar corrosion can also take place in the presence of only one metal if the concentration of the corroding solution varies at separate points on the surface of the exposed metal. This is called concentration cell type corrosion.

There are other types of corrosion such as erosion corrosion and cavitation which can take place under specific conditions, however, those already cited are considered the major types of corrosion which have been experienced in liquid fertilizers.

In addition, one should not overlook the importance of temperature as a factor in corrosion acceleration. The chemical action of an acid or a neutral salt on a metal or the electrochemical corrosion set up between two dissimilar metals is increased as the temperature goes up and the corrosion thus occurs more rapidly.

One of the most difficult materials to store from a corrosion standpoint is phosphoric acid. The chromium-nickel stainless steels, and in particular type 316, are excellent for use with phosphoric acid but are limited in use because of their high initial cost. Rubber lined steel tanks and flexible plastic liners in steel tanks are much more economical.

A new development for the storage of 75% phosphoric acid is an asphalt and burlap lined pool. This appears to be very economical especially for quantity storage. Pipe lines and valves for handling phosphoric acid should be stainless steel, rubber lined or of a suitable plastic such as polyvinyl chloride. It should be remembered, however, that rubber linings and polyvinyl chloride are affected by temperature and should not be used on lines where excessively high temperatures will be experienced.

Aluminum is the best storage material for tanks to handle nitrogen solutions other than aqua ammonia or anhydrous ammonia. Aqueous solutions of ammonia, commonly used as a source of nitrogen, and a neutralizing agent for phosphoric acid, can be stored in appropriately constructed mild steel tanks.

Various laboratory corrosion tests have been conducted on carbon steel, aluminum alloys and stainless steels to evaluate their suitability as constructional materials for storage, transportation and application of complete liquid fertilizers (1) (2). Other tests are still being conducted to determine the suitability of other materials such as the fiberglas reinforced polyesters.

In the main, laboratory data has been substantiated in field tests and under actual working conditions. Stainless steel, particularly the 304 and 316 alloys, has worked exceptionally well for transport and applicator tanks.

Aluminum, the most frequently used metal for the fabrication of transport and applicator tanks handling nitrogen solutions, has been found in field tests to be inadequate for use with complete liquid fertilizers. Corrosion takes place usually in the form of severe pitting rather than general surface attack. This corrosion on aluminum is accentuated at temperatures above ambient temperature.

Either because of cost or corrosion the liquid fertilizer industry has, in general, turned to mild steel for storing and handling liquid mixtures. The biggest problem encountered with the use of mild steel is apparently an oxidation type of corrosion which takes the form of rust scale. This corrosion is more aggressive in the vapor space above the liquid level and is most pronounced at the liquid-vapor interface. This scale continually sloughs off and has created a considerable problem during field application by stopping up line screens, valves and metering orifices.

A new type of tank material is coming into use which may eliminate many of the corrosion problems now being experienced with steel. Various polyester resins are being tested and used for tank fabrication. These plastics are generally being reinforced with fiberglas for added strength.

One problem has been to find a resin which will satisfactorily resist attack from all of the liquid fertilizer materials and yet withstand the stresses encountered during transportation and field application of the contained liquids. There is such a wide variety of materials to be applied through these tanks that formulating such a resin is extremely difficult.

Complete liquid fertilizers are usually made by neutralizing phosphoric acid with ammonia in a mixing tank or reactor tube. The material of construction for this mixing equipment is for the most part stainless steel. There are specific cases where mixing techniques allow the use of mild steel construction, however stainless steel is still recommended unless very close controls on acidity and temperature are maintained. During the manufacturing process the acidity of the solution may drop as low as pH 3 and temperatures ranging in the neighborhood of 240° F. have been experienced.

Control of pH in the finished product is also an important corrosion factor in the manufacture of fertilizer solutions. In general practice, these liquids are produced by reacting enough ammonia with the phosphoric acid to give an ammonia to phosphoric acid mole ratio of about 1.69. This corresponds to a nitrogen to phosphorus pentoxide weight ratio of 1 to 3. However, the 1.69 ratio is not the best for solubility, which is highest for many grades at a ratio of about 1.55 to 1.60.

Reducing the ammonia to acid ratio lowers the pH and if the pH is lowered far enough corrosion is increased. Therefore, a balance must be made between solubility and pH so that satisfactory solubility can be achieved, if possible, without lowering the pH to a point where corrosion is accelerated. From a corrosion standpoint a pH of 6.0 or higher is believed to be most desirable.

There are new products and new materials of construction being developed which will undoubtedly solve many corrosion problems now being experienced. However, we cannot assume that new construction materials will always work and it is wise to be just a bit skeptical about these products until they have proven successful.

For the most part materials of construction for handling fertilizer solutions have been decided upon by the trial and error method. It must be remembered that laboratory corrosion tests are only indicative of what may take place in actual practice, therefore, the liquid fertilizer industry must, to a great extent, depend upon reliable field experience and information supplied by raw material suppliers and equipment manufacturers who have the experience and background necessary to avoid many of the corrosion problems normally encountered.

*Nitrogen Division, Allied Chemical Corp., Indianapolis, Ind. From paper presented at Southern Regional Liquid Fertilizer Conference, Eatonton, Ga., February, 1960.

(1) Vreeland, D. C., Kalin, S. H., Corrosion 12, No. 11, 569t-75t (1956).
(2) Hatfield, J. D., Slack, A. V., Ag. and Food Chem. 6, No. 7, 524-531 (1958).

Careful Guidance Needed To Improve Plant Safety

By Stratton McCargo*
G.L.F. Exchange
Ithaca, N.Y.

MOST LARGE companies have a plant or two that seem to have many more accidents than the rest. Such a situation is cause for embarrassment at all levels of supervision. Certainly there must be a reason for it, but where does one turn and what does he do to correct the situation?

One way to start on the road towards reduced accidents is to review first what is now being done to protect all employees. Are there places where the safety program is failing? If no formal program is in force, one should be started immediately. Any workable safety program includes the formation of safety committees which hold regular meetings with suggested safety talks given to the committees to use in communicating with all employees.

Bulletin boards should be located where employees will have a chance to look at them, with posters and other safety information placed on them.

Periodic inspections with reports of findings should be made. The tone of the program should be such that the employees are willing to participate rather than feeling that the program is being forced on them. If many impractical demands are made, they may only serve to weaken the effectiveness of the program.

When an unusually high number of accidents have occurred, especially if a serious accident has resulted, all personnel are willing to do their part in improving their records. But mere desire is not enough. The effort, if started immediately, may have to be exerted for as long as a year or more before the accident rate is decreased. It involves constant reminders to make employees think about their movements while working in the plant and observing the safety rules.

People are creatures of habit. It is very easy to fall into bad habits when proper instruction is lacking. Once the bad habits have been adopted, it takes constant and patient reminding to change them to good habits. Poor supervisory personnel may allow bad habits to develop. To help change this, supervisory personnel should be encouraged to use such training devices as first aid courses or safety training schools.

With sincere and diligent effort on the part of all employees, it may be discovered that the very plant that needed extra attention has not only eliminated most of its accidents, but may become a plant with a superior safety record. Such a record starts with the employee, through proper guidance from the foreman, the plant manager, the production manager, the safety director and the full backing of all top executives of the company.

*Member of executive committee, fertilizer section, National Safety Council.

New Phosphoric Acid Plant Planned by General Chemical

NEW YORK — Plans to build a large, new phosphoric acid plant at the East St. Louis (Illinois) Works of Allied Chemical's General Chemical Division were announced recently by Frank J. French, president.

The plant, with a projected capacity of 50,000 tons a year of wet process acid, is scheduled for production early in 1961. The acid will be used primarily by manufacturers of fertilizers for midwest agriculture.

General Chemical currently supplies a part of the midwestern area's phosphoric acid requirements from its plant at North Claymont, Del.

Wet process phosphoric acid has been used in liquid fertilizers for the past several years, following pioneering work in the wider application of this economical form of phosphoric acid by General Chemical and others. The product is mainly used in the granulating and enriching of dry, mixed fertilizers which require a higher phosphorus content, as a component of animal feeds, and as a bacteriological nutrient in the disposal of industrial wastes.

General Chemical has long been a leading producer of basic industrial chemicals including sulfuric acid, a major raw material in the production of phosphoric acid. The division has 40 operating plants throughout the United States.

Stepan Appoints New Manufacturing Director

CHICAGO — Walter N. La Porte has joined Stepan Chemical Co. as director of manufacturing of the industrial chemicals division. In this position he will be responsible for all manufacturing operations of the division.


Walter N. LaPorte

Mr. La Porte was previously employed by Monsanto Chemical Co. as manufacturing superintendent and prior to that, engineering superintendent, of its Boston plant. Earlier, he was employed by Sun Oil Co. as a group leader in its process development laboratories.

Mr. La Porte received his B.S. in chemical engineering from Villanova College. He also attended the University of Delaware and the Wharton School where he did graduate work in engineering and business administration.

New Fertilizer Firm

BOULDER, COLO. — Mountain States Fertilizer Co., 31st and Walnut streets, has been issued a state license to do business under the management of D. K. Shore.

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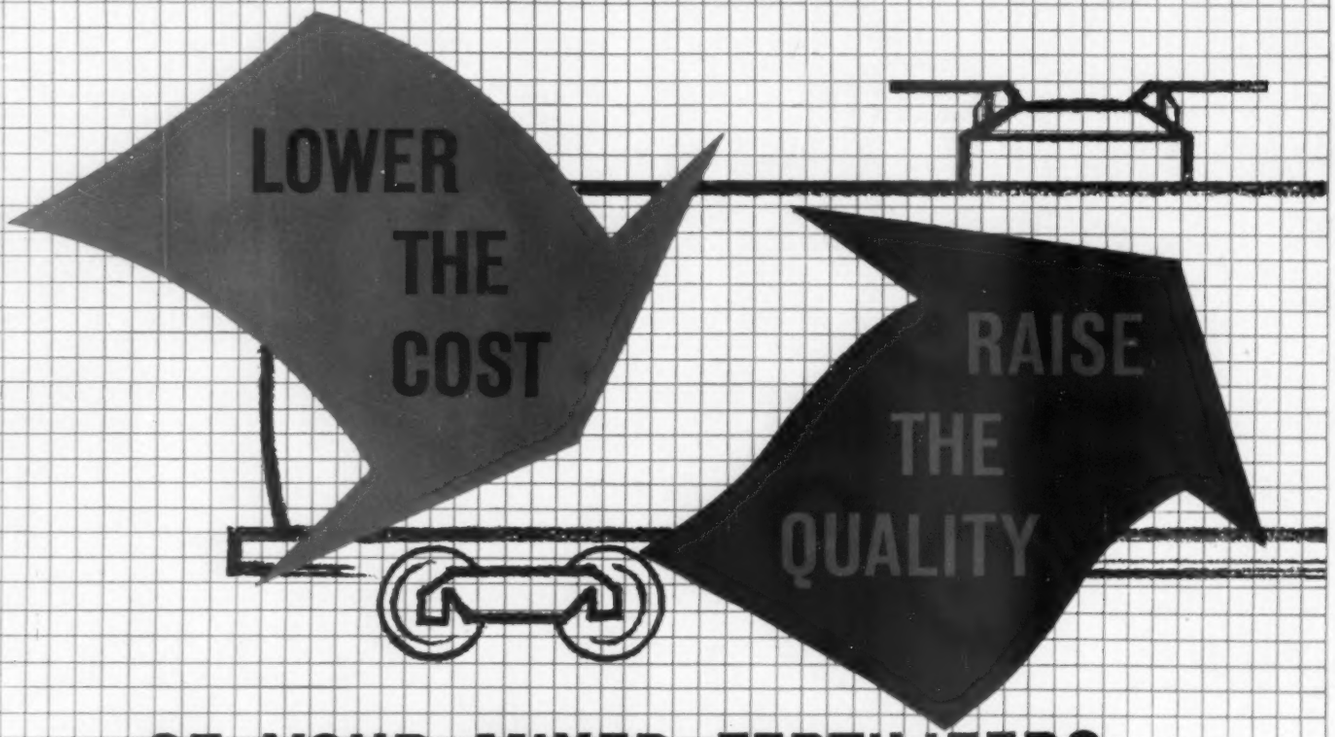
ADVANCED, NEW NITROGEN SOLUTIONS

developed by Commercial Solvents Corporation



OF YOUR MIXED FERTILIZERS

It's a pleasure to tell you about the new, exclusive (patents pending) DRI-SOL Nitrogen Solutions. This new line represents a significant advancement in ammoniating solutions. In making mixed fertilizers, you will find the performance of these solutions quite impressive. You can count on at least 7 distinct benefits:

1. Reduced shipping costs. 2. Better process control in continuous ammoniation. 3. Lower formulation costs. 4. Lower drying costs, increased dryer capacity, or a drier product. 5. Increased plant capacity. 6. Faster curing and quicker shipment. 7. Improved quality of both conventional and granular fertilizer.

In addition to these 7 advantages, you may find still other ways in which these unique DRI-SOL solutions can be useful to you. For example, these solutions can be used to help offset the high water content of low strength acid, or to produce those grades which are difficult or impossible to make with conventional solutions.

CSC's DRI-SOL Nitrogen Solutions are available in grades ranging from 24% ammonia and 76% ammonium nitrate to equal parts by weight of ammonia and ammonium nitrate. This new line of solutions is essentially anhydrous. Water content: about 0.5%.

DRI-SOL solutions are generally available in the Southern and Midwestern States. Technical literature available to fertilizer manufacturers.

AGRICULTURAL CHEMICALS DEPARTMENT

COMMERCIAL SOLVENTS CORPORATION CSC

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STATE_____

Edward R. Adams | Andrew A. Farrell | A. P. Gates | R. Daniel Smith, Jr.

V-C Elects Three Vice Presidents and Counsel

RICHMOND, VA.—The board of directors of Virginia-Carolina Chemical Corp. on May 2 elected Edward R. Adams, Andrew A. Farrell and A. P. Gates as vice presidents. At the same time, R. Daniel Smith, Jr., company attorney, was named general counsel.

Mr. Adams, formerly controller, was elected vice president — finance; Mr. Farrell, general manager, mining division, was named vice president in charge of mining; and Mr. Gates, general sales manager of the fertilizer division, was elected vice president in charge of fertilizer sales.

This action, taken at the board's regular meeting here, gives V-C a total of five vice presidents in addition to Charles T. Harding, executive vice president. The others are Dr. William P. Boyer, chemicals division and Douglas W. Laird, purchasing.

The board announced "with regret" that it had become necessary for Charles E. Heinrichs, formerly vice president in charge of mining, to relinquish his duties as vice president because of ill health. Mr. Heinrichs will continue to serve as a consultant and as a member of the board of directors.

Purchases Guano Firm For Western Sales

ROSEBURG, ORE. — Purchase of the U.S. Guano Corp. by Lynn H. Andreas, president, Oregon Red Cedar, Inc., from Frank Ruben, industrialist, for a price in excess of $100,000, was announced here recently. The sale included all physical assets of the firm which deals in organic fertilizers.

The firm will be incorporated into the Oregon Red Cedar company. Main offices will be maintained at Roseburg, but warehouses, already established, will be in Sacramento, Cal., according to Mr. Andreas.

Mr. Ruben's headquarters for the company were in Kingman, Ariz., near the source of the product. The trade name of Guano will continue to be used for the fertilizer, made from bat manure obtained from the many caves along the Grand Canyon of the Colorado river.

In purchasing the Guano company, Mr. Andreas said he acquired rights to all guano in the canyon held by the company. He stated that the purchase included more than 500,000 packages of the fertilizer in various sizes from one pound up to five pounds, all of which is available to the market.

Collier Carbon & Chemical Appoints R. H. McGough

LOS ANGELES—Collier Carbon & Chemical Corp. has announced the appointment of R. H. McGough as general manager of agricultural sales. Formerly manager of the Collier chemical sales development department, Mr. McGough has been associated with the chemical and agricultural fields for 23 years. William R. Van Liere continues as manager of domestic agricultural sales.

R. H. McGough

Formal Opening of Washington Plant Set Ahead Two Days

KENNEWICK, WASH. — Formal opening of the new $5.5 million fertilizer plant of California Spray-Chemical Corp. has been set ahead two days so the event may be attended by a group of governors from 15 states. The new date will be May 17.

The new facilities, designed and constructed by The Chemical and Industrial Corp., Cincinnati, Ohio, contain three major segments. First is the nitric acid plant with a nominal capacity of 150 tons a day, which can be increased to 180 tons a day. This plant went on stream considerably ahead of schedule.

A second segment is the ammonium nitrate plant, also finished ahead of schedule. It is a 200 tons-a-day plant that produces prilled ammonium nitrate from an almost anhydrous ammonium nitrate melt. The resultant prill is claimed to have outstanding storage qualities and can be shipped in bulk.

The third section of the plant is a complex fertilizer plant combining the P.E.C. process and the new spherodizer developed by C & I.

Manager of the new plant is Cal Dorough. (Croplife Production Edition, April 11, page 8.)

Allied Appoints Director of Sales

NEW YORK—Frank J. Woods has been appointed director of sales for Allied Chemical's General Chemical Division, it is announced by James P. Farrell, vice president.

Frank J. Woods

With the division 22 years, Mr. Woods has been heavy chemical sales manager for the past ten years. Prior to that he was insecticide sales manager for seven years. During World War II he served as supervisor of industrial relations for a subsidiary, General Chemical Defense Corp. which was operated for the government in Point Pleasant, W.Va. Mr. Woods joined the division as an insecticide salesman in New York and was subsequently appointed assistant manager of agricultural chemical sales.

V-C Purchases Fertilizer Plant at Chanute, Kansas

RICHMOND, VA.—Virginia-Carolina Chemical Corp. has announced that it will purchase the Neosho Fertilizer Co. of Chanute, Kan. at an undisclosed figure.

This will bring to 37 the number of plants operated by V-C. The Kansas facility will be the firm's farthest western plant. The plant itself is seven years old and will be producing for V-C high analysis fertilizer products including the corporation's "Harvest King" brand. It will go into operation on July 1, V-C says.

Glenn Gullikson, Dow Manager, Dies at 37

MIDLAND, MICH.—Glenn Gullikson, 37, manager of resale products, agricultural chemical division, Dow Chemical Co., died suddenly of a heart attack at Phoenix, Ariz., April 30. Mr. Gullikson, who was in Phoenix on a business trip, had not been ill previously.

He was a native of Cando, N.D., and a graduate of North Dakota Agricultural College in 1943. After graduation, he became a county agent and later conducted a business enterprise at Ortonville, Minn.

Mr. Gullikson joined Dow Chemical Co. in 1948 as a salesman in the Dakotas and Minnesota. In 1953, he went to Midland as merchandising manager of agricultural chemical products.

He had held his last position for about five years, working under William W. Allen, manager of agricultural chemical sales.

F. W. Berk & Co. Appoints Fungicide Sales Agent

WOOD-RIDGE, N.J.—F. W. Berk & Co., Inc. of Wood-Ridge announced appointment of Velsicol Chemical Corp. as sales agent of Nabam, Zineb, and Thiram effective May 1, 1960. Berk produces a number of agricultural and industrial products including carbamate fungicides and mercury salts.

Berk has manufactured Ferbam and Ziram for a number of years and will start production of Nabam, Zineb and Thiram.

Velsicol Chemical Corp. will sell the products through both its agricultural and industrial sales divisions. Foreign sales will be handled by Velsicol International Corp., S.A., Nassau, Bahamas, B.W.I., Berk said.

SAFETY THINKING

"Safety is an abstract thought until you have first-hand experience. It becomes a concrete thought with the addition of pain and suffering.

"We often forget the terrible price that must be paid when safety is forgotten. We must be quickly reminded when there is an accident with serious injuries and fatalities.

"Instructions, demonstrations, reminders—they all appear trite when we hear them, and we usually conclude such information is useful for those who are careless.

"When we are injured, we readily admit our need, past, present and future, for safety indoctrination.

"If we would take safety for just what it means, and apply it to our work in a thoughtful, diligent manner, we could eliminate the great majority of accidents that happen.

"We should at all times strive to be free of danger or injury and to eliminate hazards. If we would but do this, only the unknown, the unexpected conditions would cause accidents.

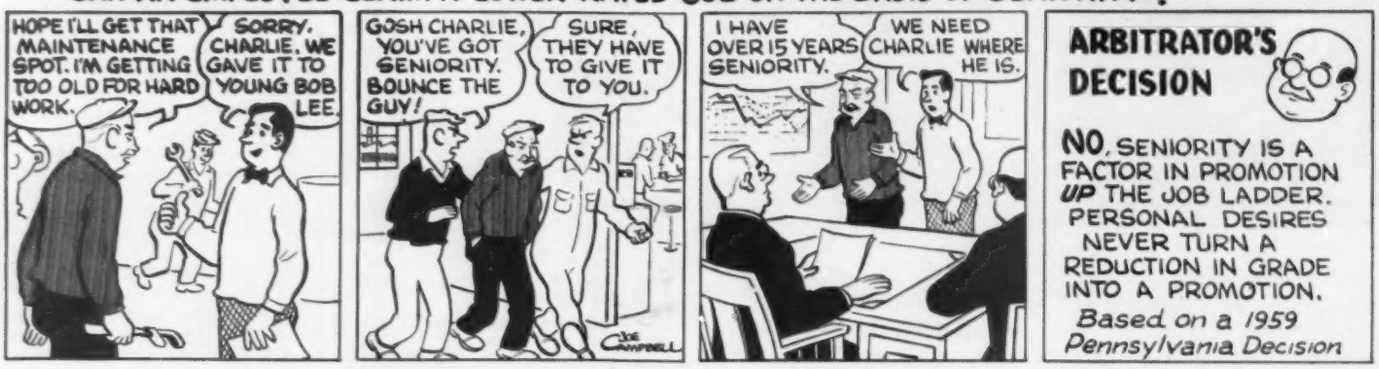
"Safety will always remain an abstract factor, unless and until we determine to make it a means of personal survival."

—JOHN E. SMITH
Director of Safety
Spencer Chemical Co.

OUTSTANDING SALESMAN

WICHITA, KANSAS — Wesley H. Somers, president of Frontier Chemical Co., was named Wichita's outstanding salesman of 1959 at the April dinner meeting of the Kansas Sales Executive Club here. Mr. Somers was cited for his "outstanding work as president of the Wichita Chamber of Commerce, and for his efforts to 'sell Wichita.'"

CAN AN EMPLOYEE CLAIM A LOWER-RATED JOB ON THE BASIS OF SENIORITY ?



Hooker Elects Officers

NIAGARA FALLS, N.Y.—Thomas F. Willers was elected president of Hooker Chemicals Limited, North Vancouver, B.C., at a meeting of directors held April 26 at corporate headquarters of the parent company, Hooker Chemical Corp., New York. Mr. Willers is also a vice president of Hooker Chemical Corp., in charge of its four divisions and corporate engineering.

Other company officers elected were: James G. Baldwin and Horace W. Hooker, vice presidents; Ansley Wilcox 2nd, secretary; Edward W. Mathias, treasurer; Thorsten O. Hammerstrom, assistant treasurer, and Douglas M. More, assistant secretary.

Phosphoric Acid Plant Construction on Schedule

KELLOGG, IDAHO—The Bunker Hill Company's new $2,000,000 130-ton per day phosphoric acid plant construction is on schedule and the firm expects to start production about July 1.

The plant is being built five years after the mining company began production of sulfuric acid as a by-product of its electrolytic zinc plant. Sulfur for the acid operation is recovered from waste gases of the electrolytic process and the sulfuric acid plant produces 100,000 tons a year which Bunker Hill markets through General Chemical Division of Allied Chemical Corp.

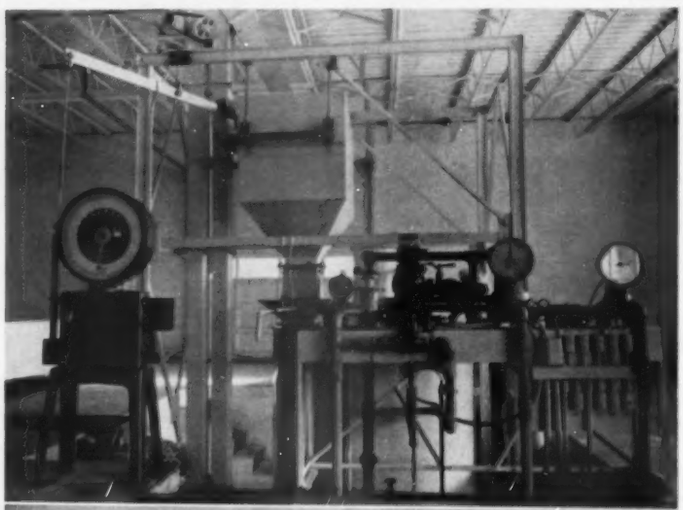
Phosphate rock for the new operation will come from a number of sources, including the firm's own holdings, a Bunker Hill spokesman said. Some of the sulphuric acid will be used in the phosphoric acid production and the end product will be marketed to fertilizer manufacturers.

The mining firm said that its own fertilizer plant is anticipated in the future as well as expanded sulfuric acid production by capturing the waste gases of its lead smelter.

The phosphoric acid plant will be 70 by 72 feet and 65 feet high with a concrete storage silo for the rock. Three acid storage tanks each 150,000 gallons are being constructed.

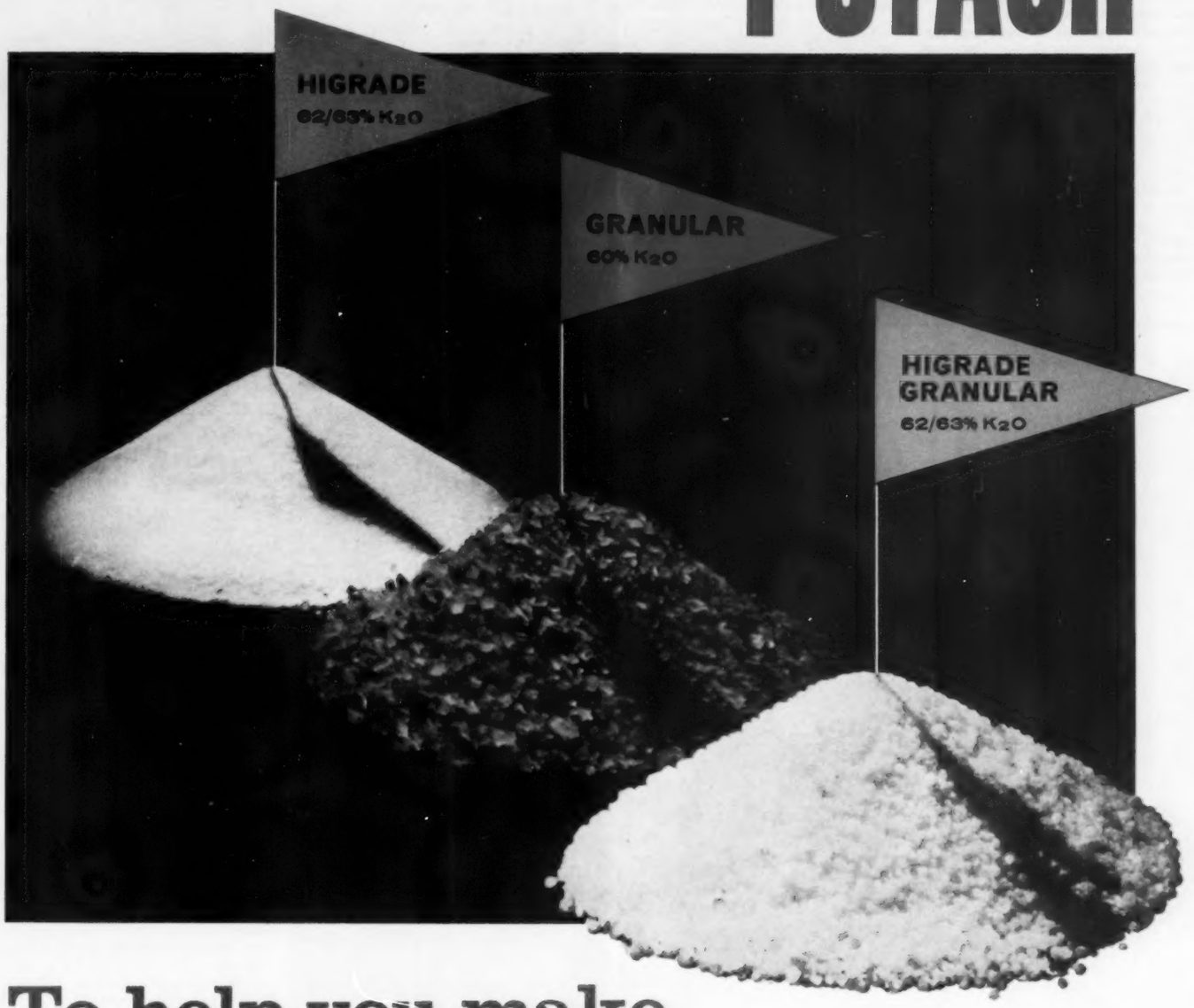
EARNINGS RISE

NEW YORK — Earnings of American Potash & Chemical Corp. in the first quarter of 1960 rose 15% on a 4.4% increase in sales. President Peter Colefax announced at the recent annual meeting of company shareholders.



LIQUID FERTILIZER PLANT—Modern plant of Farmers Liquid Fertilizer, Inc., Patterson, Ark. utilizes 54% wet process phosphoric acid normal plant run to produce about 15 tons a day of 8-24-0 liquid fertilizer. Plant was built by the J. C. Carlile Corp. of Denver, Colo. in November, 1957 Successful operation of the plant in intervening 2½ years has shown success of producing all liquid fertilizer formulas with wet process phosphoric acid with the process employed by the plant. Carlile Corp., a pioneer in development of utilizing wet process phosphoric acid, cooperated with the Tennessee Valley Authority in this work. Above photo is instrumentation for wet process complex fertilizer plant and under it, exterior view of Farmers Liquid Fertilizer, Inc., Patterson, Ark.

For you--3 types of specially sized POTASH



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Eastern States Given New Corporate Name

Signal Oil & Gas Co. has changed the name of its Eastern States Petroleum and Chemical Company division to Houston division, it has been announced by Samuel B. Mosher, chairman of the board.

Signal's Houston division was formerly Eastern States Petroleum & Chemical Corp., which merged with Signal in September, 1959.

R. N. Blaize, who was president of the former Eastern States firm, will continue to head the Houston division as a vice president and director of Signal.

Houston operations include a refinery with a capacity of 60,000 barrels a day, petrochemical manufacturing and research, and a chain of service stations.

Petrochemicals manufactured by the company's Houston division will continue to be marketed under the Espesol brand.

Monsanto Announces New Weed Killing Chemical

ST. LOUIS, MO.—"Randox T," a pre-emergence herbicide designed for control of broadleaf and grassy annual weeds in cornfields, has been announced by Monsanto Chemical Co.

The compound is applied to fields at planting time either as a spray or in granular form, the company says, and the weeds are killed as they germinate and come into contact with the chemical in the soil.

According to Charles P. Zorsch, merchandising manager of agricultural chemical sales for Monsanto's organic chemicals division, the weed killer has been found to leave no toxic soil residue that could be harmful to crops planted the next year.

Researchers Named

FALLS CHURCH, VA. — Hazleton Laboratories, Inc., biological research firm in Falls Church, has added two biochemists to its research staff, Dr. Lloyd W. Hazleton, president, has announced.

S. Stephen Schiaffino, Ph.D., comes to the laboratories from the Federal Food and Drug Administration, where for the past 12 years he has served as a research specialist in the field of nutrition and method development.

Henry A. Rutter, Jr., Ph.D., formerly with the Biochemical Research Foundation, Walter Reed Army Institute of Research, and Baltimore Hospital, has specialized in research in cancer chemotherapy.

Hazleton Laboratories conducts studies for industrial firms and government agencies on the effects of drugs and other chemicals on biological systems.

New Salesman for Grace Chemical Division

MEMPHIS—F. Wayne Weaver has joined the sales staff of the Memphis district of W. R. Grace & Co., Grace Chemical Division, it was announced by J. W. Floyd, district sales manager. Mr. Weaver will make his home in Pine Bluff, Ark. He will cover the trade in Arkansas, Louisiana and Oklahoma, selling Grace urea prills, anhydrous ammonia, feed urea and other Grace Chemical Division products.


F. Wayne Weaver

Mr. Weaver formerly sold fertilizer materials for Phillips Petroleum Co. Prior to that he was plant manager and salesman for Tennessee Liquefied Gas Co. He is a graduate of Oklahoma A.&M. with a B.S. in agronomy. He is married and has two children.

J. C. Carlile Corp. Builds Texas Plant

BROWNFIELD, TEXAS—The fertilizer division of Goodpasture Grain & Milling Co. of Goodpasture, is rounding out its first year of operation with production of 5,000 gallons of liquid fertilizer an hour being achieved. According to L. T. Stone, technical administrator in charge of production, the rate may be increased later to as much as 10,000 gallons an hour.

The plant employs the Carlile process, designed and constructed by J. C. Carlile Corp. of Denver, Colo.

A story on the Goodpasture plant appearing in the April 11 Production Edition of Croplife omitted the fact that the unit had been designed and constructed by the Carlile firm.

West Virginia Names Two to New Positions

NEW YORK — Promotion of two men to newly-created positions in the multiwall bag division of West Virginia Pulp & Paper Co. has been announced by Victor S. Luke, division manager.

Gilbert H. Dehnkamp has been named quality control director and Harold H. Rogers has been appointed industrial engineer for the division. They will be headquartered in New Orleans.

Mr. Dehnkamp joined the West Virginia organization in 1954 at the Mechanicville, N.Y., mill and transferred to the Multiwall Bag Division in 1959. He is a graduate of Rensselaer Polytechnic Institute, Troy, N.Y.

Mr. Rogers, a graduate of Georgia Tech, has been with West Virginia since it entered the multiwall bag field in 1958 and has had many years of experience in the industry.

Appointed by H. L. Stoker

CLAREMONT, CAL. — Robert Schmitt has been named Eastern district manager for H. L. Stoker Company of Claremont, Cal., manufacturer of Stoker Bag Packers and Stoker Settlers. With headquarters in Wayne, N.J. Mr. Schmitt will be responsible for sales and service for the eight offices comprising the Stoker Eastern District.


Robert Schmitt

Before joining Stoker, Mr. Schmitt was with Richardson Scale Co., first in sales service in the midwest and later was head of the Proposal Drafting Department in Clifton, N.J.

GOLDEN AWARD—Donald H. Mowell (left), president of the Floridin Company, accepts an award from R. Spencer Burress, president of the Tallahassee Chamber of Commerce, at a party sponsored by the Chamber to commemorate Floridin's fifty years of service to industry. One hundred and fifty businessmen, civic leaders and government officials attended this birthday party honoring Floridin.

Floridin Company Celebrates 50th Year of Operation

TALLAHASSEE, FLA. — The fiftieth anniversary of the Floridin Company, producer of fuller's earth diluents, carriers and extenders for pesticide formulations, was observed with a week-long celebration at Tallahassee, the firm's headquarters city.

Floridin Company was founded in 1910 to supply the oil industry with fuller's earth, a natural product whose adsorptive and filtering qualities were in demand by crude oil refiners.

Through research the company later found that fuller's earth possessed properties suiting it ideally for use as a diluent and carrier of pesticide chemicals. Floridin Company's product "Diluex" was developed as a carrier, milling aid, diluent, extender and conditioner of agricultural chemicals used in insecticides and fungicides. The product's ability to hold and carry oily or sticky pesticides while retaining dry, dustable and free-flowing properties pointed to possible use as a crop dusting agent. Floridin Company research men later found their theories to be correct.

This application of fuller's earth is one of more than 100 developed by Floridin research technicians over the years.

Floridin Company is a subsidiary of Pennsylvania Glass Sand Corp., and its mines and processing facilities are located in Quincy, Fla., one of the few places in the world where this type of fuller's earth is found.

Floridin's golden anniversary celebration was climaxed by a birthday party sponsored by the Tallahassee Chamber of Commerce in cooperation with local, county and state officials who saluted the progress made by Floridin in the past half-century.

Publication Announced

WASHINGTON — Publication of a pamphlet, "Housekeeping in the Chemical Industry"—as the second in its safety guide series, is announced by the Manufacturing Chemists' Assn.

The four-page illustrated publication covers the responsibility for good industrial "housekeeping" and the benefits derived from it. It describes in detail how this desirable practice can be established and maintained.

The first publication in the series, SG-1—Health Factors in the Safe Handling of Chemicals—was issued in January.

SMITH-DOUGLASS

Continued from page 7

apolis, Ind., Saginaw and Holland, Mich.; and Columbus, Ohio.

In 1959, a merger was completed with the Smith Agricultural Chemical Co., Columbus, Ohio, thus enlarging the Smith-Douglass activities. During that year also, the names of all company operations were changed to "Smith-Douglass Co., Inc." This included Smith-Rowland Co., Coronet Phosphate Co., Texas City Chemicals, Inc., and San Jacinto Chemical Co.

Smith-Douglass was established in 1921 when the late Oscar F. Smith began to manufacture fertilizer under the name of Smith-Reduction Corp. He later became associated with Robert B. Rowland, Jr., and another enterprise, the Smith-Rowland Co., was formed. It is now part of Smith-Douglass.

The Streator branch was opened in the fall of 1945, the first unit being a small mixing operation. Since then, six individually-operated plants have been added to the original one at Streator. Five of these manufacture fertilizer products and the sixth, a by-product, potassium silicofluoride.

Approximately 40,000 tons of materials and complete fertilizers can be stored inside the buildings at Streator, and tanks are capable of holding 3,500 tons of sulfuric acid and 1,500 tons of phosphoric acid. Production over-all is about 500 tons a day.

The contact sulfuric acid plant produces 110 tons a day and the phosphoric acid, 195 tons. The latter uses the wet process method of production. The branch's acidulating plant turns out 300 tons a day of enriched superphosphate.

The plant has storage facilities for 1,000 tons of bagged fertilizer and dock facilities for ten trucks to be loaded simultaneously. In addition, 20 railway cars can be spotted inside the plant for loading.

Smith-Douglass employs about 100 persons full time, and this number is increased to more than 200 at times during the rush seasons.

As noted in the pictures, the Smith-Douglass accounting department is equipped with the latest IBM punch card equipment designed for invoicing speed and accurate accounting procedures.

As a public relations gesture, the office maintains a coffee bar in its lobby where visitors, dealers, and truckers may help themselves to coffee and cookies while waiting.

FERTILIZER BUSINESS

WEST ALLIS, WIS. — Harvey Kuenn, Cleveland Indians outfield star, has incorporated as Kuenn Enterprises and opened a fertilizer business. It will be managed by Jack Jenney.

Economical Advantages in Use Of Modern Fertilizer Packaging

By Richard P. Kessler

Manager, Multiwall Packaging Laboratory
West Virginia Pulp & Paper Co.
New York

DURING THE past 18 months, new developments in the multiwall shipping sack industry have had a great effect on the packaging and handling of fertilizers. This article discusses developments in packaging commercial grades of fertilizer resulting in better packages at less expense to the manufacturer. Standard SOM (sewn open mouth) or SV (sewn valve) bags in a 3 or 4-ply construction incorporating an asphalt laminated barrier sheet, are the most universally used constructions for the general handling for the various mixes packed. These constructions include:

1/90 Asphalt laminated ply, 2/40 natural kraft plies.
1/50 lb. Natural kraft ply.
1/90 Asphalt laminated ply, 2/60 natural kraft plies.

(The constructions reading from the inside to the outside of the bag.)

With the introduction of "Clupak" extensible paper into the multiwall bag field, the following constructions have been added:

1/100 Asphalt laminated, 1/40 "Clupak," 1/50 "Clupak."

This construction for the 80 and 100 lb. units has proved to be a noteworthy package. Other variations of constructions to fit individual needs have been developed and are available from the various shipping sack manufacturers.

A second item that has gained wide use in the last year is the application of lightweight coating of polyethylene, from 6-10 lb. weight on the inner ply in both sewn and pasted style bags.

The multiwall bag industry has expended large amounts of time, money, and efforts to develop better and more economical packages for the fertilizer industry.

Many new type constructions, barrier sheet types, and styles of packages are being tested continuously to supply the fertilizer trade with the best unit possible for the particular application.

In our discussion perhaps a review of some of the characteristics of packages would be advantageous to the user and a help in the procurement of packages most suitable for his needs. It is intended that we will begin by breaking down the type bags being used for application and changes that have been made that may be of advantage to the user.

Types of Bags

1. Sewn open mouth (SOM). This is a gusseted style or flat tube made from 2 to 6 plies with one end closed in the factory by means of tape, filler cord and thread; the other end left open for filling. This bag has had wide acceptance throughout the fertilizer industry, is easily filled and closed on a variety of filling and closing machines.

2. Sewn valve bag (SV). This is a gusseted tube sewn closed to both ends with one corner folded in and left open for filling. This bag is filled by means of a valve packer and is supplied with a variety of sleeves in the valve opening to form a positive closure and prevent sifting and moisture gain.

3. Pasted valve (PV). The pasted valve bag is manufactured from a flat tube from 2 to 6 plies of specification natural kraft or "Clupak" extensible papers and both ends are pasted closed in the bag factory with one corner left open for filling. This bag is used for packaging all grades of fertilizer and is supplied with various styles of barrier sheets; valve opening closure devices to prevent sifting.

4. Pasted open mouth (POM). This bag is manufactured from natural kraft or "Clupak" papers in a flat tube using from 1 to 6 plies. One end is factory closed by folding and pasting and the other end is left open for filling. This bag is generally used as an overslip to recoup broken bags in storage or transit, closed by sewing or wire tying.

5. Pasted open mouth-self opening style (POM-SOS). This is a gusseted style tube with one end closed forming a pasted rectangular bottom; the other end is left open for filling. This style package is used most generally for 10 and 25 lb. units and is particularly adaptable to plant and garden fertilizers.

Valve Closures

In both the sewn and pasted style bags it is necessary to incorporate some type of sleeve or valve extension to prevent sifting of product from the valve opening and to reduce a possibility of moisture gain through this area. Typical example of the type sleeve or extension used is as follows:

Straight extension of all plies to extend into the bag on both sewn and pasted. In some instances the extension is slit to provide more positive closure. In a sewn valve an internal sleeve can be used cut in several different styles to fit the particular product. This is a better closure than the ply extensions. The most positive closure for both the sewn and pasted valve style bag is a tuck-'n-sleeve. This again is applied in the variety of cuts and sizes to fit the requirements of the product being packed.

In the packaging of fertilier the

product is such that it will absorb moisture from the atmosphere. Therefore, in areas where the atmospheric moisture is a problem a barrier sheet is incorporated in the construction. The most generally used barrier in the fertilizer industry has been a standard asphalt laminated sheet.

Two grades are generally used; first, two 30 lb. natural kraft ply combined with 30 lb. asphalt; second, two 25 lb. natural kraft plies combined with 25 lb. alsphalt. Some variations of these natural kraft asphalt plies have been used but did not gain general acceptance.

In the extensible type bag two grades of asphalt laminated plies are generally used; the first, two 35-lb. "Clupak" plies laminated with 30 lb. of asphalt; the second, two 40-lb. "Clupak" plies laminated with 30 lb. of asphalt.

During the past year the use of polyethylene-coated natural kraft and "Clupak" papers has gained acceptance due to the change in manufacturing the pasted valve bag. Presently a 6 to 10-lb. coating of polyethylene as an inner ply is being used with excellent success in the pasted valve bag in the stepped-end style.

Some use of micro-crystalline wax laminate in place of asphalt has been made for special applications. A laminated sheet of natural kraft or "Clupak" using polyethylene as a laminating agent has been tried with various degrees of success.

Packaging Equipment

Customer demands for mixed fertilizer, granular fertilizer, fertilizer pesticide mixtures have resulted in changes in both the style and type of multiwall shipping sack and the equipment necessary for filling and closing.

Higher speed valve packers with close weight tolerances are being developed with different principles than previously used. These include the new style air-pressure packers and high speed belt units, which are gaining wide acceptance in the trade.

Also gaining acceptance are high speed open mouth filling units incorporating new automatic bag holders.

Closing equipment, particularly in the case of sewn bag closures, is now available with various type tape attachments, heat seal tape attachments, tape over stitching attachments and automatic feeds and guides. All these changes in the equipment field tend to increase the efficiency and quality of the finished units loaded for shipment from the producing plant.

Operations

In general the operation starts with the procurement of a multiwall paper shipping sack designed to package a particular grade of fertilizer being produced and packed on a specialized piece of packaging equipment. The unfilled sacks must be stored prior to filling and storage area should be provided to effect as near as possible atmospheric conditions of approximately 50% RH to temperatures of approximately 70-75°F. Such conditions will maintain a high quality package having a moisture content in paper used of approximately 6 to 6.5% and will provide the most efficient working unit when maintained under such conditions.

Paper shipping sacks that have dried out and become brittle will decrease the efficiency of the operation and increase the failure rate of the units during the packing, loading, and shipping operations. (A booklet published by the Paper Shipping Sack Manufacturers Assn., 370 Lexington Ave., New York City, gives detailed instructions regarding proper storage and handling of unfilled shipping sacks.)

Filling and Closing

A properly filled and closed shipping sack provides an adequate unit for shipping, warehousing, and distribution. Poor settings on both filling and closing equipment can cause high rates of failure. Such equipment should be kept in good repair at all times. A carefully prepared, well-advertised fertilizer, incorporating the know-how and technological advances of the fertilizer manufacturer, loses much of its sales appeal if the bag has been carelessly handled in the filling and closing operation. A customer is much more impressed with packages having straight-line stitching, evenly spaced from the top, and valve openings neatly closed.

A filled multiwall sack meeting the above desired conditions can act as an effective "silent salesman," especially if the printing and design layout takes full advantage of the areas exposed to the public eye.

Storage Requirements

Atmospheric conditions that occur during periods of prolonged storage must be taken into account when designing a multiwall bag so that the proper type of barrier sheet and closure are used. A high-priced barrier in the construction is rendered useless when the closures are not effective.

It must always be kept in mind that changes in fertilizer formulation from one year to the next also may have a decided effect on the packages used. When changes are made, thought should be given to possible changes in bag size and construction to meet the requirements of the changes in formulation.

Hygroscopic materials are generally more difficult to package than other materials. When such materials are stored in warm, humid climates, the bags used should provide greater protection than afforded in bags employed to package similar materials in drier regions.

A fertilizer manufacturer, to be successful, should heed the following points in developing his packaging requirements.

A package should be tested and approved for

a) **size**

b) **performance based on proper construction**

c) **adequate closures**

d) **strong, attractive design and easily read printing and symbols on the finished package.**

Here are additional pointers that can contribute to a successful overall operation:

(a) Packers. Open mouth or valve should be maintained in excellent condition; scales should function properly.

(b) Sewing equipment should be well adjusted and synchronized with conveying units, along with attention to needle size, stitches that measure 3.0 to 3.2 to the inch, and proper tension on thread.

(c) Conveying equipment should be well adjusted and well kept.

PRODUCTION EDITION

Editorial

Optimism a Trade Mark for Manufacturers In Fertilizer and Pesticide Industries

OPTIMISM is an indispensable ingredient in the makeup of our industry. Without it, would pesticide makers dare to formulate great quantities of materials to kill weeds and insects? Would fertilizer manufacturers invest in thousands of tons of raw materials if they were fearful of the coming season?

Naturally, there are various breeds and degrees of optimism. But the kind that counts is the type that says: "It's going to be a good season, and we'll prepare for it." It is the philosophy that has kept the agricultural chemical industry going for many years. The forward look coupled with confidence in both the immediate and distant future makes business grow.

Leaders in the chemical trade know this about as well as any group in the land. Particularly those in the agricultural end of the chemical business. Despite all the pressures against pesticides and some unfavorable factors facing the fertilizer industry, progress continues to be made and overall optimism continues to prevail.

The place for optimism in our thinking was expressed neatly in a recent talk by Henry B. duPont, vice president of E. I. duPont de Nemours & Co., Inc. before a college group in Texas. He emphasized that the greatness of the United States was not achieved by timid souls fearful of taking risks for future gain. Hardy pioneers were not looking for someone to guarantee their future nor did they ask for an accurate measure of the risk to which their ventures might be exposed.

America was built, he said, by "those whose intuitive grasp of opportunity was over and beyond statistical need; by those who backed their cast of the dice with courage, with faith, and with resolution.

"Most of our country's progress has come through a spirit of boundless confidence and optimistic disregard of the consequences of failure. There is hardly a successful venture in our history, industrial or national, against which excellent arguments, highly logical arguments, could not have been advanced at the outset.

"Undoubtedly, there were sound reasons why the transcontinental railroad should not be built, why the Homestake Mine should not be opened, or why the settlements beyond the Ohio should never have been attempted.

"Fortunately, the optimist has always prevailed. Progress is never the product of pessimism. Vigorous institutions in science, in business, in government or the arts, are monuments to affirmative thinking, not to the sober head-shaking 'no.'

"We can be grateful that in America the Ayes have always had it. Much of our progress, it must be said, has come about because dreams have triumphed over cautious reality; because the poetry has proved more persuasive than the prose."

Business optimism is, of course, dependent upon the attitude of the individual who, after all, is the important entity in any enterprise. Dreams of the future are a sort of personal property, and faith, courage and resolution are responsive to individual inspiration. Judgment is based on knowledge and wisdom in applying today's technology to the present and the future.

It is the responsibility of the individual in management to evaluate the scientific tools at hand for their part in future use, and to think of such as a means to an end, rather than being ends in themselves.

The fertilizer and pesticide industries, to a larger degree than most trades, are looking to the future for better technology, more effective production facilities and, of course, having all of this add up to a wider margin of profit.

Optimism, being both commendable and necessary, is greatly encouraged and enhanced by seeing progress being made day after day and year after year. The temporary detractions are only passing incidents in the long-term picture, we think. The industry can look forward with confidence to continuing advancements in both its productive know-how and greater use of its manufactured products.

Fishy Story on Fire Ants

YOU MIGHT call it justice of sorts, that fire ants have caused the death of thousands of fish in ponds in five Mississippi counties. Not that anyone is ever happy to see fish perish by the scores of hundreds, but this is a case where wildlife lovers and others who wanted to preserve and protect birds, game, and fish, had fought bitterly against the use of pesticides to control the fire ant, only to have the insects themselves turn into killers. One could well raise the question at this point about which does the more actual damage: the pesticides used to control these fiery insects, or the ants themselves.

The manner in which the ants caused fish deaths is unusual, it is true. Heavy rains swept the insects into the streams and ponds and the fish gobbled them up. The ants, true to form, apparently stung the fish to death. It would appear, then, that the rather remote chance that harm might come to wildlife via pesticides is considerably less real than the fact that thousands of perfectly good fish have actually been victimized by the pest.

It is likely that many members of various state fish and wildlife groups who have fought so strenuously to prevent further pesticide application against the fire ant, may now do a little reconsidering. They may now recall a prediction made recently by W. G. Cowperthwaite, state plant commissioner of Florida, who has repeatedly tangled with those who opposed the control program.

"I believe that some day in the not too distant future, the same forces that fought so hard to stop the eradication program will take steps to protect wildlife—not a mythical protection from insecticides, but a very real protection from this ant," he commented only a few weeks ago. (Croplife, April 18, page 1.) It would appear that Mr. Copperthwaite's words may have been more prophetic than he realized.

Although the pesticide manufacturing industry has some stake in the fire ant program, the main point is broader. It shows once again, that insect pests cannot be allowed to get out of hand without the end cost being far greater than would have been the price of control.

Pesticide makers involved in the fire ant program may now hope to see a slackening of opposition to the idea of eradicating this vicious pest from the relatively small areas now infested.

Croplife's Home Office

Croplife®
PRODUCTION EDITION

BPA — *Member of Business Publications Audit*

NBP — *Member of National Business Publications*

CROPLIFE is a controlled circulation journal published weekly. Weekly distribution of each issue is made to the fertilizer manufacturers, pesticide formulators and basic chemical manufacturers. In addition, the dealer-distributor-farm adviser segment of the agricultural chemical industry is covered on a regional (crop area) basis with a mailing schedule which covers consecutively, one each week, three geographic regions (South, Midwest and West) of the U.S. On the fourth week, production personnel in fertilizer manufacturing and pesticide formulating plants throughout the U.S. are covered in depth. To those not eligible for this controlled distribution, Croplife's subscription rate is $5 for one year ($8 a year outside the U.S.). Single copy price 25¢.

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Donald Neth, Managing Editor

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Industry Meetings

June 13-18—National Plant Food Institute annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

June 21-22—Annual meeting, Southern Feed & Fertilizer Control Officials, Riverside Hotel, Gatlinburg, Tenn.

June 28-30—Pacific Branch Meeting, Entomological Society of America, Davenport Hotel, Spokane, Wash.

July 13-15—Eleventh annual Fertilizer Conference of the Pacific Northwest, Hotel Utah, Salt Lake City. R. R. Bertramson, State College of Washington, Pullman, Wash., chairman.

July 27-29—Great Plains Agricultural Council, 1960 meeting, Laramie, Wyo.

July 27-30—Southwest Fertilizer Conference and Grade Hearing, Galvez Hotel, Galveston, Texas.

Aug. 7-11—Rocky Mountain Conference of Entomologists, Cameron Pass, Gould, Colorado.

Sept. 12-14—Eighth annual meeting and conference, Canadian Agricultural Chemicals Assn., Britannia Hotel, Lake of Bays, Muskoka, Ont., Can.

Sept. 24-26 — Western Agricultural Chemicals Assn. 31st annual meeting, Palm Springs Riviera Hotel, Palm Springs, Cal.

Sept. 29-30 — Northeast Fertilizer Conference, Hotel Hershey, Hershey, Pa.

Oct. 5-6—Southeast Fertilizer Conference, Atlanta Biltmore Hotel, Atlanta, Ga.

Oct. 17-21—National Safety Congress, 48th annual meeting. Fertilizer Section meets at La Salle Hotel, Chicago.

Nov. 3-4—Pacific Northwest Plant Food Assn. 1960 annual convention, Boise, Idaho.

Nov. 13-15—California Fertilizer Assn., 37th annual meeting, del Coronado Hotel, Coronado, Cal.

Pacific Plant Food Convention Dates Set

PORTLAND, ORE.—The board of directors, Pacific Northwest Plant Food Assn., at a recent meeting here, selected the dates of Nov. 3-4 for the group's 1960 annual convention. The event will be held at Boise, Idaho.

At the same time Ralph Nyblad was appointed general convention chairman while Trevlo Steele and "Swede" Cummings will serve as program co-chairmen.

In other action the board approved Pendleton Grain Growers, Pendleton, Ore., and Huntington-Cummings Co., Walla Walla, Wash., as full voting members.

Director Ray Whitcomb reported committee action on a proposal to set up association districts with a director to be elected from each district. This plan will be studied by the board and will be submitted to the full voting membership at the annual fall convention.

Dale Massie, Cominco Products Co., Salem, Ore., was elected to the industry vacancy on the association soil improvement committee.

MOVES TO NEW QUARTERS

CATASAUQUA, PA. — New, enlarged quarters are now being occupied by Fuller Co.'s Kansas City district office, company officials have announced. The address for this office now is: 7501 Mission Rd., Kansas City 15, Mo. Reason for the move, according to the announcement, is to cover new markets and provide increased customer service. The firm makes pneumatic materials handling systems.

Swift Appoints Head of Customer Service Dept.

CHICAGO—H. P. Gould, manager of Swift & Co.'s phosphate center, Bartow, Fla., has announced recent appointment of R. E. Kelly as head of the center's customer service department. Mr. Kelly succeeds Vernon Shirley, who passed away suddenly in March, 1960.

R. E. Kelly

Mr. Kelly has had varied experience in Swift's agricultural chemical operations, having served in manufacturing and sales capacities in various cities, including Bartow, Chicago and Atlanta.

Chemical Employment Remains Constant

WILMINGTON, DEL. — Employment in chemical manufacturing in Delaware remained steady during March, with 27,100 workers employed, the same as in February, according to the monthly report of the Delaware Unemployment Compensation Commission.

In January there were 27,000 workers. The number of chemical production workers in March is 600 higher than for the corresponding month a year ago when 26,500 were employed.

Average weekly earnings declined between February and March from $126.38 to $125.87. A gain was noted in average hourly earnings, $3.07 in March and $3.06 in February. A decline was shown in the average work week, 41 hours in March and 41.3 in February.

New York Sales Head Named by Paper Firm

NEW YORK—West Virginia Pulp & Paper Co. has named Kenneth W. Glazebrook as New York district sales manager for multiwall products, according to Victor S. Luke, division manager. He succeeds James A. Mundie, who is now staff assistant to Sheldon Y. Carnes, northern region manager.

K. W. Glazebrook

The New York district sales office serves industrial and consumer accounts in New York, New England, Pennsylvania and Delaware.

Joining the firm in 1957, Mr. Glazebrook has been manager of commercial printing paper sales for the Philadelphia area where he helped organize the company's program of direct selling to commercial printers. He was previously with the Denison Manufacturing Co. and studied at the Bentley School of Finance.

Canadian Chemicals Group Plans Program

MONTREAL — The 8th annual meeting and conference of the Canadian Agricultural Chemicals Association will be held at the Britannia Hotel, Lake of Bays, Muskoka, Ont., Sept. 12 to 14, inclusive.

Addresses will include "Evaluating New Pesticides" by Dr. F. Glen, director general, research branch, Canada Department of Agriculture; "Insect Resistance" by Dr. A. W. A. Brown, department of entomology, Western University, London, Ont.; "Tariff Reference 120" by J. A. Davis, chairman, Chemical Industry Tariff Committee; and "Selling and Advertising" by Louis F. Czufin, California Spray-Chemical Corp.

Additional details will be released prior to the conference.

Classified Ads

Classified advertisements accepted until Tuesday each week for the issue of the following Monday.

Rates: 15¢ per word; minimum charge $2.25. Situations wanted, 10¢ a word; $1.50 minimum. Count six words of signature, whether for direct reply or keyed care this office. If advertisement is keyed, care of this office, 20¢ per insertion additional charged for forwarding replies. Commercial advertising not accepted in classified advertising department. Display advertising accepted for insertion at minimum rate of $11 per column inch.

All Want Ads cash with order.

SITUATIONS WANTED

YOUNG MAN, NOW IN LIQUID FERTILIZER business with general knowledge of all aspects of liquid fertilizer, wishes to relocate in same or allied field. Some college, no military obligation and married. Address Ad No. 5892, Croplife, Minneapolis 40, Minn.

MACHINERY FOR SALE

FOR SALE: ONE LINK-BELT NO. 814 Multi Louvre cooler—good condition—used three years. Indiana Farm Bureau Co-op., 47 South Pennsylvania St., Indianapolis, Ind.

FOR SALE: TWO 7 FT. X 7 FT. T.V.A. Ammoniator drums—new shells only used for 15,000 tons. Price includes base, tires, and spare repair parts. $2,000 each. Indiana Farm Bureau Co-op., 47 South Pennsylvania St., Indianapolis, Ind.

FOR SALE: ONE CARRIER CONVEYOR screen—triple deck, used only three years, excellent condition. 14 ft. long x 3 ft. wide. Priced to sell at $2,500. New price—$8,535. Several sections of new screen cloth included, also 10 H.P.T.C. motor. Indiana Farm Bureau Co-op., 47 South Pennsylvania St., Indianapolis, Ind.

Joins Monsanto as Section Project Manager

ST. LOUIS—Dr. George W. Selleck of Saskatoon, Sask., Canada, has joined Monsanto Chemical Co. as a project manager in the agricultural chemicals section of the Organic Chemicals Division.

John S. Harris, section manager of agricultural chemicals development, said that Dr. Selleck's responsibilities concern the development and commercialization of pesticides, concentrating initially on Monsanto's new herbicides, Avadex, Randox-T, Randox and Vegadex.

Dr. Selleck carried out his undergraduate work at the University of Saskatchewan where he received his M.S. degree in plant ecology in 1952. He received his Ph.D. degree in botany from the University of Wisconsin (1956).

Prior to joining Monsanto, Dr. Selleck served as assistant professor of plant ecology on the University of Saskatchewan faculty, specializing in weeds and their control.

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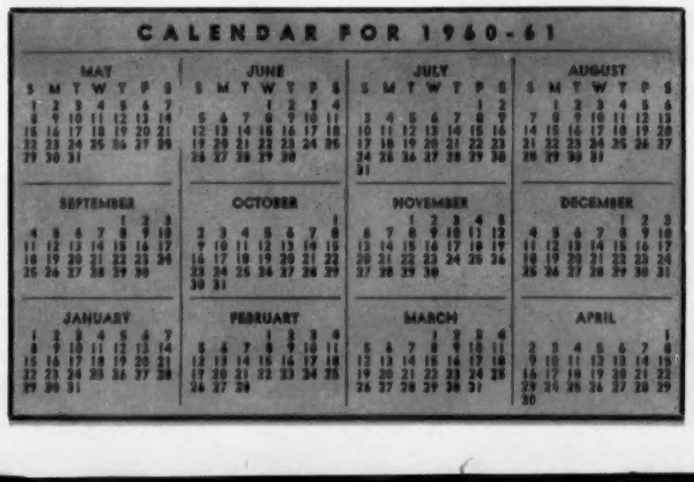
CALENDAR FOR 1960-61



Serving customers who buy NH_3 and Nitrogen Solutions . . .

All in a Day's work for George

George Day, that is. George is the man customers have come to depend upon for these reasons: (1) George is from Standard Oil, a supplier with 70 years' experience making products that meet specifications and delivering these products to customers *on time.* (2) The Standard Oil Anhydrous Ammonia and Nitrogen Solutions which George sells are produced in one of the industry's most modern plants located in one of the best railway and highway shipping centers in the U.S. (3) One of the Midwest's largest quality control laboratories insures the high quality and "on spec." character of these products.

Customers also know George can be depended upon to look after their needs. Twenty-three years' experience serving customers for Standard Oil has taught him how to give these customers the kind of service that means profits *for them.*

Would you like help from George Day? Call him at **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

You expect more from **STANDARD** *and you get it!*